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NASA SP-7011 (154)

AEROSPACE MEDICINE AND BIOLOGY

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WITH INDEXES

(Supplement 154)

MAY 1976

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges:

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NASA SP-7011 (154)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 154)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in April 1976 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 253 reports, articles and other documents announced during April 1976 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes—subject and personal author—are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1976 Supplements.

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All publications abstracted in this Section are available from the Technical Information Service, American Institute of Aeronautics and Astronautics, Inc. (AIAA), as follows: Paper copies are available at $5.00 per document up to a maximum of 20 pages. The charge for each additional page is 25 cents. Microfiche[1] are available at the rate of $1.50 per microfiche for documents identified by the # symbol following the accession number. A number of publications, because of their special characteristics, are available only for reference in the AIAA Technical Information Service Library. Minimum airmail postage to foreign countries is $1.00. Please refer to the accession number, e.g. (A76-13400), when requesting publications.

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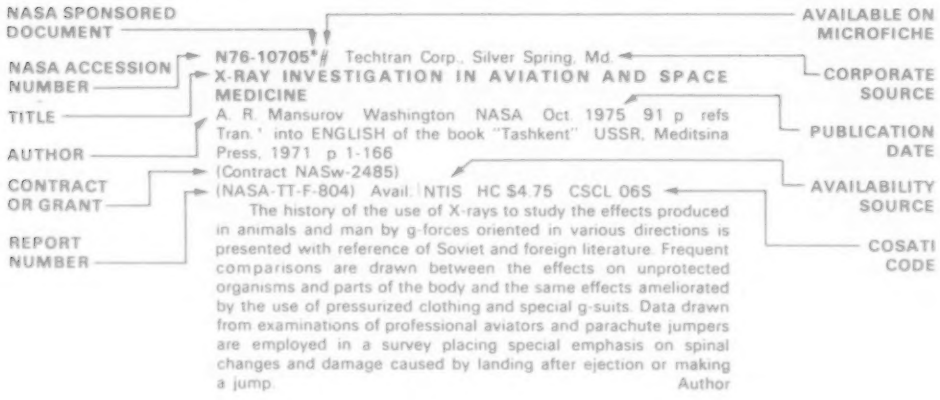
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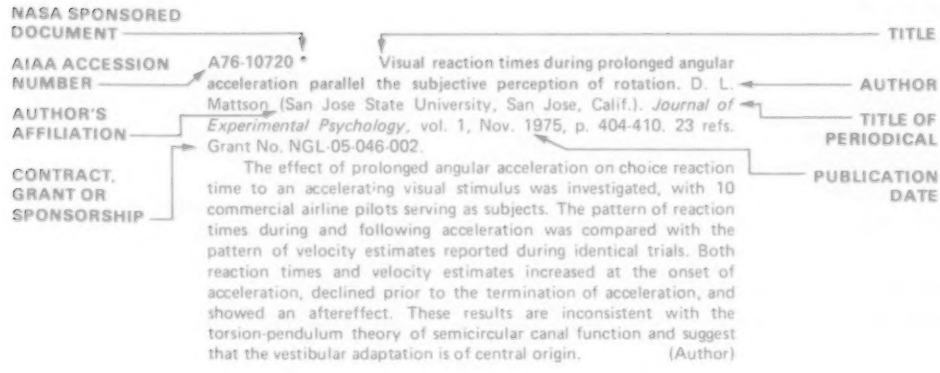
N76-10705*# Techtran Corp., Silver Spring, Md.
X-RAY INVESTIGATION IN AVIATION AND SPACE MEDICINE
A. R. Mansurov Washington NASA Oct. 1975 91 p refs Tran.* into ENGLISH of the book "Tashkent" USSR, Meditsina Press, 1971 p 1-166
(Contract NASw-2485)
(NASA-TT-F-804) Avail: NTIS HC $4.75 CSCL 06S
The history of the use of X-rays to study the effects produced in animals and man by g-forces oriented in various directions is presented with reference of Soviet and foreign literature. Frequent comparisons are drawn between the effects on unprotected organisms and parts of the body and the same effects ameliorated by the use of pressurized clothing and special g-suits. Data drawn from examinations of professional aviators and parachute jumpers are employed in a survey placing special emphasis on spinal changes and damage caused by landing after ejection or making a jump.
Author

TYPICAL CITATION AND ABSTRACT FROM *IAA*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A76-10720 * Visual reaction times during prolonged angular acceleration parallel the subjective perception of rotation. D. L. Mattson (San Jose State University, San Jose, Calif.). *Journal of Experimental Psychology*, vol. 1, Nov. 1975, p. 404-410. 23 refs. Grant No. NGL-05-046-002.
The effect of prolonged angular acceleration on choice reaction time to an accelerating visual stimulus was investigated, with 10 commercial airline pilots serving as subjects. The pattern of reaction times during and following acceleration was compared with the pattern of velocity estimates reported during identical trials. Both reaction times and velocity estimates increased at the onset of acceleration, declined prior to the termination of acceleration, and showed an aftereffect. These results are inconsistent with the torsion-pendulum theory of semicircular canal function and suggest that the vestibular adaptation is of central origin. (Author)

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 154)

MAY 1976

IAA ENTRIES

A76-18950 **Effects of aircraft noise on the mental work of pupils.** Y. Ando, Y. Nakane (Kobe University, Kobe, Japan), and J. Egawa (Osaka Educational University, Osaka, Japan). *Journal of Sound and Vibration*, vol. 43, Dec. 22, 1975, p. 683-691. 10 refs.

A76-19016 # **On the spontaneous frequency of the structural chromosome aberrations /anomalies/ in lymphocytes from human blood.** S. L. Todorov (Vissh Meditsinski Institut, Sofia, Bulgaria). *Bolgarskaia Akademiia Nauk, Doklady*, vol. 28, no. 10, 1975, p. 1427-1430. 9 refs.

The paper is devoted to the study of radiation-induced mutagenesis on the subcellular level. The analysis of spontaneous chromosome anomalies was performed on irradiated and non-irradiated cultures consisting of 6000 metaphase cells obtained from 47 people. The anomalies detected in the lymphocytes included chromatid fragments, chromosome fragments, dicentrics, interstitial diletions, and chromatid exchanges. A relationship was established between radiation-induced anomalies and the phase of the cell cycle.
B.J.

A76-19095 * **Corticosteroids and ACTH are not required for compensatory adrenal growth.** W. C. Engeland, J. Shinsako, and M. F. Dallman (California, University, San Francisco, Calif.). *American Journal of Physiology*, vol. 229, Nov. 1975, p. 1461-1464. 20 refs. Research supported by the University of California; Grants No. NIH-AM-06704; No. NIH-GM-00927; Contract No. NCAR-665-401.

A76-19173 **Review and analysis of color coding research for visual displays.** R. E. Christ (New Mexico State University, Las Cruces, N. Mex.). *Human Factors*, vol. 17, Dec. 1975, p. 542-570. 153 refs. Contract No. N00014-70-A-0147-003.

The paper is a comprehensive review of the experimental literature on the effects of color on visual search and identification performance as observed in 42 studies published over the period 1952-1973. The primary aim was to determine whether or not color, relative to achromatic target features, can be expected to affect search and identification performance, while the secondary aim was to identify the gaps in knowledge and to recommend a research program directed at closing the gaps. Quantitative analyses of collected data indicate that color may be a very effective performance factor under certain conditions, but that it can be detrimental under others. Tentative conclusions about the nature of these conditions are drawn.
S.D.

A76-19268 # **Sixty two days on board Salyut 4. (Shest'desiat dva dnia na 'Saliute-4'. I).** V. Sevast'ianov. *Aviatsiia Kosmonavtika*, Nov. 1975, p. 42, 43. In Russian.

In this paper, cosmonaut Sevast'ianov discusses the two months he and cosmonaut Klimuk spent on board the Salyut 4 orbital base. Stressing the effects of weightlessness, he notes that 'complete' adaptation to weightlessness was reached toward the end of first month in space. It was only then that the cosmonauts began to work, move, and exercise without experiencing greater strain than on the earth. He describes the training (jogging on a minitrack 1.5 hr daily, operating a bicycle ergometer 1 hr daily) and the prophylactic measures that were taken to prepare the organism for gravity, the encounter with which he describes as a 'shock'. He notes that the days in space were very busy and that photographs of 8.5 million sq km of the Soviet territory and 600 spectrograms of various regions of the solar disk were among the data returned to earth. Extensive medical tests both in orbit and on return to earth are mentioned, a major aim of which was to develop regimes that would facilitate adaptation to weightlessness and also to gravity on return to earth.
V.P.

A76-19338 * **Epidemiological, clinical and sleep laboratory evaluations of insomnia.** E. O. Bixler, A. Kales, and J. D. Kales (Milton S. Hershey Medical Center, Hershey, Pa.). In: Insomnia: Clinical aspects and treatment. Bologna, University of Bologna Press, 1975, p. 17-28; Discussion, p. 33, 34. 38 refs. Discussion in Italian. Research supported by the Foundation for Psychobiological Research; Grant No. NGR-39-009-204; Contract No. NAS9-10835.

Epidemiological studies have contributed to the understanding of the total scope of the insomnia problem, both in terms of the incidence of sleep difficulties, and the extent and frequency of hypnotic drug use. Clinical studies - at the Sleep Research and Treatment Center - have been used to evaluate the medical, psychological, pharmacological and situational factors contributing to insomnia, and to evaluate the psychotherapy and chemotherapy best suited to treatment of insomnia. The sleep laboratory studies were of two types: (1) the study of sleep induction, sleep maintenance, and sleep stages, and (2) the use of hypnotic drugs, emphasizing their effectiveness in inducing and maintaining sleep, and the duration of this effectiveness.
B.J.

A76-19339 * **Treating the insomniac patient - General measures and psychological and pharmacological treatment.** A. Kales, E. O. Bixler, and J. D. Kales (Milton S. Hershey Medical Center, Hershey, Pa.). In: Insomnia: Clinical aspects and treatment. Bologna, University of Bologna Press, 1975, p. 137-143; Discussion, p. 147. 5 refs. Discussion in Italian. Research supported by the Foundation for Psychobiological Research; Grant No. NGR-39-009-204; Contract No. NAS9-10835.

The general preliminary measures for treating insomnia include moderate physical exercise several hours before bedtime, and the relaxation of complex mental activity before bedtime. A case history concerning a woman with marital troubles is offered as evidence that insomnia may be caused by deeply rooted psychological and situational problems. Another case history illustrates how prior pharmacological treatment may complicate the process of clinically evaluating an insomniac.
B.J.

A76-19418 # **Psychological conditions for the simultaneous formation of groups of concepts and sensory images (Psikhologicheskie usloviia odnovremennogo formirovaniia gruppy poniatii i chuvstvennykh obrazov).** N. N. Nechaev and A. I. Podol'skii. *Psikhologicheskie Issledovaniia*, no. 5, 1975, p. 79-85. 15 refs. In Russian.

The multistage formation of mental concepts (sensory images) is investigated as the transition from the formation of isolated concepts to the formation of groups of concepts or images. This process is relevant to the performance of a human operator, in that he deals with a display, not of isolated objects, but of groups of objects. The psychological analogy of these display groups is the groups of concepts or sensory images. Two experimental models are used to

illustrate this process: the formation of a group of legal concepts, and the visual identification of a system of objects under conditions of variable perception noise. B.J.

A76-19419 # **Investigation of the operational structure of the process of identifying graphical images (Issledovanie operatsional'noi struktury protsessa opoznaniia graficheskikh izobrazhenii).** V. P. Zinchenko, V. M. Gordon, and T. M. Gushcheva. *Psikhologicheskie Issledovaniia*, no. 5, 1975, p. 115-120. 11 refs. In Russian.

An experiment was designed in the framework of operator identification of images on display devices. It consisted of the identification of eight different brands of automobiles which where flashed on a screen at random many times each in the form of a schematized image (a black and white slide). The experimental apparatus consisted of an electroencephalograph, an electro-oculograph for measuring the vertical and horizontal components of the eye movements, a biocurrent integrator, and an instrument for monitoring the verbal response. The purpose of the experiment was to measure the time characteristics of the initial period of identification, as well as the functional characteristics of the peripheral and central visual system. B.J.

A76-19420 # **Latency and duration of the manual movements of an operator under two modes of observation (Latentnost' i dlitel'nost' ruchnykh dvizhenii operatora pri dvukh rezhimakh nabliudeniia).** A. I. Nazarov and B. A. Sosnovskii. *Psikhologicheskie Issledovaniia*, no. 5, 1975, p. 121-132. In Russian.

The sensorimotor performance of an operator incorporated in a semi-automatic control system is studied, with emphasis on speed and precision of performance. In the experiment the operator must respond to two command words repeatedly flashed on a screen. One word directs him to place a metal pencil on the starting point, and the other, to place the pencil into a metal compartment 10 mm in size. The purpose of the experiment is to measure the latent period between the flashing of the command signal and the moment the pencil is picked up, the duration of pencil movement from start to finish, and the number of times the goal was missed. B.J.

A76-19421 # **The problem of 'malfunctions' and errors of a human operator (Problema 'otkazov' i oshibok cheloveka-operatora).** Iu. F. Gushchin and A. A. Piskoppel'. *Psikhologicheskie Issledovaniia*, no. 5, 1975, p. 133-142. 13 refs. In Russian.

The reliability of a man-machine system depends equally on the reliability of man and machine. The paper reviews progress in remedying human error in the framework of psychological conditioning. The battle against error is conducted on the level of personnel selection and training, and on the level of the modification of design decisions. B.J.

A76-19422 # **The structure of human control activity and its conversion into an automatic control system (Struktura upravlencheskoi deiatel'nosti cheloveka i ee preobrazovanie v ASU).** E. D. Telegina and L. P. Gur'eva. *Psikhologicheskie Issledovaniia*, no. 5, 1975, p. 143-155. 25 refs. In Russian.

General methodology for investigating mental activity, particularly decision making, associated with control is developed. Ways of incorporating these mental processes into the structure of automatic control systems are discussed. The control activities of an accountant are used to illustrate the problem, and to define the role of the human operator in a fully automatic control system. B.J.

A76-19589 * **Thyroid hormone-induced changes in body temperature and metabolism during exercise in dogs.** H. Kaciuba-Uscilko, S. Kozlowski, Z. Brzezinska, K. Nazar, A. Ziemba (Polska Akademia Nauk, Zaklad Badan Medycznych, Warsaw, Poland), and J. E. Greenleaf. *American Journal of Physiology*, vol. 229, Aug. 1975, p. 260-264. 31 refs. NASA-supported research.

A76-19661 # **Specific features of cortical neurons in response to skin thermostimulation (O spetsificheskikh osobennostiakh neironov kory mozga, reagiruiushchikh na termostimuliatsiiu kozhi).** T. V. Kozyreva (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR) and K. P. Ivanov (Akademiia Nauk SSSR, Laboratoriia Termoreguliatsii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 61, Nov. 1975, p. 1612-1618. 8 refs. In Russian.

A76-19662 # **Correlation of oscillatory electroretinogram potentials and evoked potential components in the visual cortex (O sootnoshenii ostsilliatornykh potentsialov elektroretinogrammy i komponentov vyzvannogo otveta zritel'noi kory).** G. B. Abdullaev, N. A. Gadzhieva, V. K. Zheretienko, and A. I. Dmitrenko (Akademiia Nauk Azerbaidzhanskoi SSR, Laboratoriia Biofiziki Mozga and Laboratoriia Neirofiziologii Integrativnoi Deiatel'nosti Mozga, Baku, Azerbaidzhan SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 61, Nov. 1975, p. 1626-1633. 14 refs. In Russian.

A76-19663 # **Responses of neural units of the frog's lateral semicircular canal to caloric stimuli of varying amplitude (Otvety edinits nerva lateral'nogo polukruzhnogo kanala liagushki na kaloricheskie stimuly meniaiushcheisia amplitudy).** I. V. Orlov (Akademiia Nauk SSSR, Laboratoriia Fiziologii Vestibuliarnogo Apparata, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 61, Nov. 1975, p. 1640-1651. 15 refs. In Russian.

Responses of isolated neural units of the lateral semicircular canal (LSC) in curarized frogs to short local caloric stimuli of different amplitudes inducing an excitatory current of the endolymph in the LSC are studied. An analysis of measurements of peak frequencies (PFs) in the responses indicates that the PFs in the responses of 52% of the units exhibit either a linear or semi-logarithmic dependence on the peak temperature (PT). In 22% of the units, PFs show a saturation at a PT of 8 to 12 C. In 25% of the units, PFs first varied with PT in direct proportion, and then with increasing PT they varied in inverse proportion. The results obtained suggest that controlled caloric stimulation is well suited for studying the dynamic characteristics of neurons in the semicircular canals. S.D.

A76-19664 # **Heat metabolism in man under various degrees of body overheating (Teplovoi obmen cheloveka pri razlichnykh stepeniakh peregrevaniia organizma).** A. N. Azhaev. *Fiziologicheskii Zhurnal SSSR*, vol. 61, Nov. 1975, p. 1704-1708. In Russian.

Experiments were conducted to study heat metabolism in healthy male subjects aged 20-25 yr and exposed to ambient temperatures of 30, 40, 50 and 60 C for 60 min and to 70 and 80 C for 70 and 20 min respectively. The airflow rate was 0.2-0.3 m/sec with a relative humidity of 15-25%. Mechanisms underlying the impact of high temperature on the heat content of the organism at the various stages of body overheating are studied. Major conclusions are that at the ambient temperature of 50 C body overheating is attributed to endogenous heat production and that over the temperature range 60-80 C the heat accumulation source combines both endogenous and exogenous heat production. S.D.

A76-19665 # **Mechanisms of thermogenic action of noradrenalin in cold adaptation (O mekhanizmakh termogennogo deistviia noradrenalina pri adaptatsii k kholodu).** V. I. Sobolev and S. A. Pevnyi (Donetskii Gosudarstvennyi Universitet, Donetsk, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 61, Nov. 1975, p. 1709-1714. 11 refs. In Russian.

A76-19666 # **Effect of noradrenalin on the central control of thermoregulation associated with temperature adaptation (Effekt noradrenalina na tsentral'noe upravlenie termoreguliatsiei v sviazi s temperaturnoi adaptatsiei).** V. K. Trusova and A. F. Davydov (Akademiia Nauk SSSR, Laboratoriia Termoreguliatsii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 61, Nov. 1975, p. 1715-1722. 21 refs. In Russian.

A76-19667 # **Evaluation of skin blood flow and heat loss during thermoregulatory response by means of a mathematical model (Otsenka s pomoshch'iu matematicheskoi modeli kozhnogo krovotoka i teplootdachi pri termoreguliatornoi reaktsii).** Ia. A. Bedrov (Akademiia Nauk SSSR, Vychislitel'nyi Tsentr, Leningrad, USSR) and B. I. Gekhman (Akademiia Nauk SSSR, Laboratoriia Termoreguliatsii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 61, Nov. 1975, p. 1723-1729. 9 refs. In Russian.

A76-19696 # **Effect of a sudden change of time environment on some circadian rhythms in man (Vliianie vnezapnogo izmeneniia vremennoi sredy na nekotorye tsirkadnye ritmy cheloveka).** N. I. Moiseeva (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 61, Dec. 1975, p. 1798-1804. 24 refs. In Russian.

Experiments were conducted to study the mechanisms of adaptation to a sudden change of time environment on the basis of model rhythms for the pair sleep/arousal and the circadian rhythm pertaining to the indices of the cardiovascular system during transmeridian flights, especially when crossing 9 time zones moving eastward. It is shown that during flights to the East, body responses occur immediately, sleep duration reduces, blood pressure decreases, and the diurnal fluctuations of the cardiovascular parameters tend to smooth out. In the case of flight to the West, organic readjustment begins on the 2nd day with various changes in the parameters of sleep and the cardiovascular system. Use of hypnotic drugs during flights results in improving the subjective condition of the testees and in accelerating the course of adaptation to new temporal conditions. S.D.

A76-19697 # **The role of noradrenalin in the regulation of muscular thermogenesis during cooling (O roli noradrenalina v reguliatsii myshechnogo termogeneza pri okhlazhdenii).** K. P. Ivanov and T. M. Lariukhina (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 61, Dec. 1975, p. 1805-1811. 15 refs. In Russian.

The effects of intravenous administration of noradrenalin as well as its administration into the brain lateral ventricles on the intensity of cold-induced muscle shivering, heat production, threshold of shivering, and rectal temperature in rabbits previously unadapted to cold are studied. It is shown that the peripheral function of noradrenalin in the thermoregulatory system of the organism is different from its central function. The peripheral impact of noradrenalin on muscular thermogenesis is to stimulate thermogenesis by enhancing the threshold of shivering and decreasing its intensity without impairing the thermal homeostasis of the organism. The central effect of noradrenalin involves a decrease in thermogenesis through inhibition of shivering. S.D.

A76-19698 # **Erythropoietic properties of the plasma in hypodynamia (Eritropoeticheskie svoistva plazmy pri gipodinamii).** M. M. Shcherba, O. I. Moiseeva, A. M. Volzhskaia, and E. N. Glazunov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 61, Dec. 1975, p. 1825-1830. 28 refs. In Russian.

Experiments were carried out to study the erythropoietic properties of the plasma in healthy male subjects, aged 22-43 yr, in hypodynamic condition by being strictly confined to bed for a period of 49 d. It is shown that hypodynamia reduces the content of erythropoietin in the plasma, as a result of which erythropoietin inhibitor is revealed in most of the subjects (16 out of 21) on the 8th day of bed confinement. There is enough evidence to support the

A76-19699 # **Lymph flow during stimulation of vasomotor structures in the hypothalamus and the medulla oblongata (Limfotok pri vozdeistviiakh na vazomotornye struktury gipotalamusa i prodolgovatogo mozga).** A. M. Beketaev, R. A. Gareev, and T. D. Kim (Akademiia Nauk Kazakhskoi SSR, Institut Fiziologii, Alma-Ata, Kazakh SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 61, Dec. 1975, p. 1873-1877. 16 refs. In Russian.

Results are presented for a comparative study of the influence of electrical stimulation of and mechanical damage to the structures in the anterior hypothalamus and the medulla oblongata on the lymph flow, blood pressure, and tonus of the jugular lymphatic vessel in mongrel dogs with identical parameters of the applied stimulus. It is shown that electrostimulation of the medulla causes a more significant change in the blood pressure and the perfusate flow from the jugular lymphatic vessel, whereas a more pronounced increase in lymph flow in the thoracic duct is observed during stimulation of the structures in the anterior hypothalamus. Mechanical damage to the medulla is found to enhance the lymph flow in the thoracic duct to a greater degree than damage to the structures of the anterior hypothalamus. S.D.

A76-19701 **Flight-induced changes in human amino acid excretion.** J. P. Ellis, Jr., B. O. Hartman, R. R. Bollinger, and J. B. Garcia, Jr. (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 47, Jan. 1976, p. 1-8. 36 refs.

A biomedical appraisal of flight stress was made by means of a battery of urinary determinations on crewmen who participated in a 96-h airborne alert. The crewmen were divided into three teams, each consisting of 16 members and each manning an EC-135J aircraft. These teams took turns so as to assure that one team was airborne at all times during the alert; flights lasted either 8.5 or 12 h. Preflight baseline data were collected from only one of the three teams. Based on baseline and flight data obtained for that team, urea excretion correlated well with amino acid output which, in turn, correlated remarkably well with alpha-amino nitrogen output. These data collectively revealed the following flight effects: (1) marked anticipatory stress immediately before the start of the airborne alert; (2) marked flight stress late in each flight flown during the first 48 h; and (3) adaptation to flight stress during the final 48 h. (Author)

A76-19702 **Use of Sr-85 as an indicator of bone mineral replacement in dogs after disuse demineralization.** H. E. Palmer and M. T. Karagianes (Battelle Pacific Northwest Laboratories, Richland, Wash.). *Aviation, Space, and Environmental Medicine*, vol. 47, Jan. 1976, p. 17-19. 5 refs.

A76-19703 **Acclimation processes by daily exercise stints at temperate conditions followed by short heat exposures.** E. Kamon (Pennsylvania State University, University Park, Pa.). *Aviation, Space, and Environmental Medicine*, vol. 47, Jan. 1976, p. 20-25. 23 refs. Grant No. PHS-OH-00583; Contract No. N00014-67-A-0402-0009.

The possibility of reducing the time of heat exposure for acclimation is studied by subjecting physically unconditioned subjects to an acclimation regimen which included 30 min of exercise of different intensities in a temperate room, followed by a 30-min walk in a heated room. This procedure is assumed to represent the minimal combination of exercise and heat exposure that would induce acclimation and be practical. Acclimation is evaluated by the increase in tolerance time for the walk in the heat, decrease in heart rate, rectal temperature, and mean skin temperature. Test results indicate that acclimation processes can be induced by using stints of negative and/or positive work on a laddermill, followed by short work-heat exposure. No change of sweating rate is observed, the ambient conditions being such that free evaporation is allowed. S.D.

A76-19704 **Comparison of an impedance device to a displacement plethysmograph for study of finger blood flow.** L. D. Montgomery. *(Aerospace Medical Association, Annual Scientific Meeting, 46th, San Francisco, Calif., Apr. 28-May 1, 1975.) Aviation, Space, and Environmental Medicine*, vol. 47, Jan. 1976, p. 33-38. 15 refs.

Results are presented for a comparative study of digital blood flow indices as measured with a commercially available impedance rheograph and a pulsatile air displacement plethysmograph. The measurements were made on the medial phalanges of the first,

second, and third fingers of both hands. Blood flow indices were calculated from extrapolated slopes of the recorded impedance and mechanical changes occurring during systole. Results indicate that both noninvasive techniques are reproducible and consistent over a large number of trials. Since the F-ratio comparing simultaneous and bilateral impedance values is much smaller than that for the displacement system, it is suggested that the impedance device yields more consistent results than the plethysmograph under consideration. S.D.

A76-19705 **Disorienting effects of aircraft catapult launchings. II.** M. M. Cohen (U.S. Navy, Naval Air Development Center, Warminster, Pa.). *Aviation, Space, and Environmental Medicine*, vol. 47, Jan. 1976, p. 39-41. 5 refs. Navy Project ZR04101.

Experiments were conducted to study the disorienting effects of exposure to Gx (chest-to-spine) accelerations in terms of their visual and postural components in four catapult-experienced aviators without any apparent visual, motor, or vestibular abnormalities. The visual or oculogravic illusion causes seen objects to appear to rise above their true physical positions, while postural or somatogravic illusion causes the pilot to feel his body tilted backwards. Each of the four subjects oriented himself to the gravitational vertical both before and after exposure to the accelerations under two conditions: (1) while he sat in total darkness, and (2) while he viewed a small target projected at eye level in his mid-sagittal plane. Postural illusion tends to be smaller and to decay more rapidly when the target spot is illuminated than when the subject is in total darkness. Results suggest that under operational conditions the oculogravic illusion may enhance rather than diminish the disorientation, since the cockpit instruments appear to rise along with the pilot's illusory perception of being tilted backwards. S.D.

A76-19711 **Aircrew medical standards and their application in the Royal Australian Air Force.** R. L. DeHart, E. F. Kramer (USAF, Hospital, Kirtland AFB, N. Mex.), and E. E. Stephenson (Royal Australian Air Force, Dept. of Air, Canberra, Australia). *Aviation, Space, and Environmental Medicine*, vol. 47, Jan. 1976, p. 70-76. 7 refs.

Aircrew selection and health maintenance are key factors in the Aviation Medicine Program of the Royal Australian Air Force. The physical standards employed by the RAAF in selecting aircrew are reviewed. The aircrew selection process for the 5 years 1969 to 1973 are presented with emphasis given to medical causes for rejection. A careful analysis of reasons for failure to complete aircrew training was conducted. The results of this analysis are presented with special emphasis being given to medical wastage. The process of medical evaluation of trained aircrew is discussed along with the 1969-1973 experience with aircrew duty restrictions and waivers granted for medical conditions. The RAAF experience with medical wastage of trained aircrew is similar to the experience of other nations, both as to wastage rates and body systems involved. (Author)

A76-19712 **Pregnant stewardess - Should she fly.** P. Scholten (California, University, San Francisco, Calif.). *Aviation, Space, and Environmental Medicine*, vol. 47, Jan. 1976, p. 77-81. 56 refs.

There is much pressure on the airlines to allow stewardesses to fly while pregnant. Some of them want to fly in quite advanced stages of pregnancy. This paper offers a survey of the problem, the hazards that may occur and some guidelines for the physician. The author outlines the normal changes to be expected with advancing pregnancy and those factors that could have an adverse effect on a pregnant stewardess and her fetus, such as hypoxia, trauma, abortion, the hazards of travel, and flying itself. Certain legal problems of unemployment and medical disability also are discussed. Travel alone offers no real danger to the pregnant stewardess in the first trimester of pregnancy; however, because of the changing mechanics of her size, posture, and increasing unsteadiness, it would be wisest to require a pregnant stewardess to cease flying at 13 weeks, with an absolute prohibition on flying after the 20th week. (Author)

A76-19714 **Use of pilot heart rate measurement in flight evaluation.** A. H. Roscoe (Royal Aircraft Establishment, Bedford, Hants., England). *Aviation, Space, and Environmental Medicine*, vol. 47, Jan. 1976, p. 86-90. 13 refs.

Experimental test pilots involved in the flight evaluation of handling qualities and systems were monitored for heart rate during an investigation to assess the possible use of this measure to augment their subjective opinions. Reference is made to examples from several different flight trials using a variety of aircraft types. It is concluded that pilot heart rate measurement is a worthwhile technique and can play a useful part in flight evaluation provided that certain limitations are recognized. (Author)

A76-19724 **Effect of target separation on selective attention.** R. T. Solman (Australian National University, Canberra, Australia). *Perceptual and Motor Skills*, vol. 41, Dec. 1975, p. 755-760. 16 refs.

A visual search task, in which subjects searched circular stimulus displays for two instances of a prespecified target, was used to investigate the effects of target-separation on accuracy. When a comparison was made of the total number of targets correctly located at each separation, no significant differences were found, and this suggested that, within the range of separations examined, the selective processing of the relevant items was not influenced by the distance separating them. Also, assuming that the redundancy of target items increased the probability of a target being perceived, the differences between the number of first targets correctly located and the number correct in a single target condition, were in the predicted direction. However, they failed to reach significance. (Author)

A76-19815 **Influence of ancient solar-proton events on the evolution of life.** G. C. Reid (NOAA, Aeronomy Laboratory, Boulder, Colo.), T. E. Holzer (High Altitude Observatory, Boulder, Colo.), P. J. Crutzen (NOAA, Aeronomy Laboratory; National Center for Atmospheric Research, Boulder, Colo.), and I. S. A. Isaksen. *Nature*, vol. 259, Jan. 22, 1976, p. 177-179. 21 refs.

This article discusses a mechanism that could explain the apparent correlation between faunal extinctions and reversals in polarity of the geomagnetic field more satisfactorily than any other mechanisms proposed so far. The present mechanism involves disappearance of the geomagnetic field during polarity reversals, intense bombardment of broad areas of the earth by solar protons and galactic cosmic rays, and the resultant removal of the ozone shield through the catalytic action of NO. Estimates are made of ozone reductions resulting from increased stratospheric production of NO by the continuous action of galactic cosmic rays and by sporadic solar-proton events during polarity reversals. The calculations show that very substantial ozone reductions must accompany intense solar-proton events during polarity reversals and that the total effect on living organisms may be sufficient to lead to extinction. It is concluded that the current concern about possible anthropogenic destruction of stratospheric ozone is apparently well founded. F.G.M.

A76-19816 * **Amino acids in modern and fossil woods.** C. Lee, J. L. Bada (California, University, La Jolla, Calif.), and E. Peterson (NASA, Ames Research Center, Planetary Biology Div., Moffett Field, Calif.). *Nature*, vol. 259, Jan. 22, 1976, p. 183-186. 27 refs. NSF-supported research.

The amino acid composition and the extent of racemization in several modern and fossil woods are reported. The method of analysis is described, and data are presented on the total amino acid concentration, the amino acid ratios, and the enantiomeric ratios in each sample. It is found that the amino acid concentration per gram of dry wood decreases with age of the sample, that the extent of racemization increases with increasing age, and that the amounts of aspartic acid, threonine, and serine decrease relative to valine with increasing age. The relative racemization rates of amino acids in wood, bone, and aqueous solution are compared, and it is shown that

racemization in wood is much slower than in bone or aqueous solution. Racemization results for woods from the Kalambo Falls area of Zambia are used to calculate a minimum age of 110,000 years for the transition between the Sangoan and Acheulian industries at that site. This result is shown to be consistent with numerous radiometric dates for older Acheulian sites in Africa and to compare well with geologically inferred dates for the beginning of the Eemian and the end of the Acheulian industry in southern Africa. F.G.M.

A76-19820 **The function of contour in metacontrast.** R. Growney (Connecticut, University, Storrs, Conn.). *Vision Research*, vol. 16, no. 3, 1976, p. 253-261. 32 refs.

The stimulus characteristics which constitute edge information for the visual system were studied by investigating the manner in which edge luminance is related to reduction in apparent brightness in metacontrast masking. Both targets and masks were briefly-flashed, nonoverlapping, rectangular apertures in which the luminance was modulated spatially in the horizontal dimension. The edge gradient was either gradual, a step function, or a step function with an additional spatial transient. The results showed that reduction in apparent brightness of the target is strongly influenced by the edge luminance of both the target and the mask. The data are discussed in terms of possible underlying mechanisms and with respect to other apparent brightness phenomena. (Author)

A76-19821 **Pattern detection and the two-dimensional Fourier transform - Flickering checkerboards and chromatic mechanisms.** D. H. Kelly (Stanford Research Institute, Menlo Park, Calif.). *Vision Research*, vol. 16, no. 3, 1976, p. 277-287. 20 refs. NSF Grant No. GB-33322X; Grant No. NIH-EY-01128.

Fourier effects are obtained from simple detection thresholds for checkerboard and striped gratings, without using complex waveforms, masking or pattern adaptation. Spatial contrast predicts that the checkerboard thresholds should be lower than the bar-grating thresholds, but this never occurs. The opposite result, predicted magnitude detection in the two-dimensional Fourier domain, occurs in a variety of flicker experiments, with red or green homochromatic fields, and under selective chromatic adaptation. It persists at spatial frequencies as low as 1.4 c/deg, and cannot be attributed to stray light, image blur, or orientational selectivity. Even with opponent-color patterns of unvarying luminance, the bar-check sensitivity ratio is still pi/2 (as predicted by the Fourier magnitudes) over a broad frequency range. This Fourier mechanism seems to affect both achromatic and opponent-color pathways equally; it therefore cannot be inferred that its location is postretinal. (Author)

A76-19822 **Critical duration for resolution of acuity targets.** J. L. Brown and J. E. Black (Rochester, University, Rochester, N.Y.). *Vision Research*, vol. 16, no. 3, 1976, p. 309-315. 15 refs. Grant No. PHS-EY-00680; Contract No. N00014-67-A-0398-0007.

Line grating patterns which illuminated a 1 deg test field centered 1.5 deg from the fovea were presented in either of two orientations for various flash durations of from 2 to 1000 msec. Grating pattern frequencies of from 2 to 10 c/deg were used. Luminance thresholds for correct identification of grating orientation were measured in the dark-adapted eye and against mesopic and low photopic background luminances. The critical duration within which temporal summation occurred was most significantly in-adaptation level. This was true for all spatial frequencies investigated, including the highest for which discrimination always depended upon cones. Change in critical duration with adaptation cannot therefore be attributed to a transition from cone to rod function. Critical duration was found to vary nonmonotonically with changing spatial frequency, passing through a maximum at a lower spatial frequency for higher adaptation level. (Author)

A76-19826 # **Medical-biological investigations carried out on board the Salyut 4 orbital stations.** N. N. Gurovskii. *COSPAR Information Bulletin*, no. 74, Dec. 1975, p. 34-36.

Some of the major objectives of the 30-day space mission described were to study the reactions of the human body to weightlessness and other flight factor, to assess the effectiveness of countermeasures against the effects of weightlessness and the effectiveness of techniques developed to maintain adequate physical performance during flight, and to provide data for improving the onboard system of medical control. The countermeasures included treadmill and bicycle-ergometer exercises, use of G-suits and of special suits designed to prevent circulation disorders upon reentry, and the use of lower-body negative pressure and drugs during five days prior to reentry. Readaptation to gravity conditions was accompanied by fatigue, heaviness of the body and arms, vertigo upon head tilts, and tachycardia and dizziness in the upright position. Comparative analysis of pre- and post-flight examinations indicates that the pattern and duration of readaptation to gravity depends strongly on the duration of the mission. V.P.

A76-20066 **Electrocardiographic manifestations of concealed junctional ectopic impulses.** C. Fisch, D. P. Zipes, and P. L. McHenry (Indiana University, Indianapolis, Ind.). *Circulation*, vol. 53, Feb. 1976, p. 217-223. 18 refs. Research supported by the Herman C. Krannert Fund, American Heart Association, and Indiana Heart Association; Grants No. NIH-HL-06308; No. NIH-HL-05363; No. NIH-05749.

A76-20067 **Vectorcardiographic criteria for the diagnosis of anterior myocardial infarction.** J. W. Starr, G. S. Wagner, R. M. Draffin, J. B. Reed, A. Walston, II, and V. S. Behar (Duke University Medical Center; U.S. Veterans Administration Hospital, Durham, N.C.). *Circulation*, vol. 53, Feb. 1976, p. 229-234. 19 refs. Grants No. PHS-PH-43-NHLI-67-1440; No. NIH-HL-17670. USVA Project 9300-03.

Frank lead vectorcardiograms (VCG) from four carefully selected subgroups comprising a total of 226 patients were analyzed to develop optimal criteria for the diagnosis of anterior myocardial infarction. Highest sensitivity and 95% specificity was obtained by screening out patients having anterior QSR forces with maximal anterior amplitudes in excess of 0.1 mV and durations longer than 24 msec. The performance of this criterion was evaluated in a second group of patients. The incidence of false positive diagnosis was less than 1% with a sensitivity in excess of 95%. The overall performance of the criterion was significantly better than widely accepted VCG and ECG criteria for anterior myocardial infarction. C.K.D.

A76-20068 **Evaluation of vectorcardiographic criteria for the diagnosis of myocardial infarction in the presence of left ventricular hypertrophy.** H. R. Phillips, J. W. Starr, V. S. Behar, A. Walston, II, J. C. Greenfield, Jr., and G. S. Wagner (Duke University Medical Center; U.S. Veterans Administration Hospital, Durham, N.C.). *Circulation*, vol. 53, Feb. 1976, p. 235-240. 28 refs. Grants No. PHS-PH-43-NHLI-67-1440; No. NIH-HL-17670. USVA Project 9300-03.

A76-20069 **Cardiac imaging using a phased array ultrasound system. I - System design.** O. T. von Ramm and F. L. Thurstone (Duke University, Durham, N.C.). *Circulation*, vol. 53, Feb. 1976, p. 258-262. 8 refs. Grants No. PHS-HL-12715; No. PHS-HL-14228; No. PHS-HL-17670-01; No. PHS-HS-01613.

A new two-dimensional, real-time, high resolution ultrasound imaging system is described. This system uses a linear array of ultrasound transducers to generate tomographic images of the heart in a circular sector format. Phased array techniques allow rapid steering of the ultrasound beam so that images are produced at the rate of 20 per second, or more, while maintaining a resolution of 2-4 mm throughout the field of view. (Author)

A76-20070 **Cardiac imaging using a phased array ultrasound system. II - Clinical technique and application.** J. Kisslo, O. T. von Ramm, and F. L. Thurstone (Duke University Medical Center, Durham, N.C.). *Circulation*, vol. 53, Feb. 1976, p. 262-267. 12 refs. Grants No. PHS-HL-12715; No. PHS-HL-14228; No. PHS-HL-17670-01; No. PHS-HS-01613.

A new two-dimensional ultrasound imaging system capable of producing high resolution tomographic images of the heart in real time has been developed. This system relies on phased array principles to rapidly steer the ultrasound beam through the structures under investigation. A hand-held linear array of 16 ultrasound transducers with overall dimensions of 14 mm by 24 mm at the site of contact may be readily manipulated to image various cardiac structures. The resulting images are displayed in a circular sector format. This imaging system has proven particularly useful for the delineation of left ventricular spatial geometry by the identification of endocardium, myocardium, papillary muscles and interventricular septum. High quality images of anterior and posterior mitral leaflets, aortic root and aortic leaflets as well as left atrium and other cardiac structures have been obtained. (Author)

A76-20071 **Relation between echocardiographically determined left atrial size and atrial fibrillation.** W. L. Henry, J. Morganroth, A. Pearlman, C. E. Clark, D. R. Redwood, S. B. Itscoitz, and S. E. Epstein (National Institutes of Health, National Heart and Lung Institute, Bethesda, Md.). *Circulation*, vol. 53, Feb. 1976, p. 273-279. 25 refs.

In an attempt to define quantitatively the relation between left atrial size and atrial fibrillation, echocardiography was used to study 85 patients with isolated mitral valve disease, 50 patients with isolated aortic valve disease, and 130 patients with asymmetric septal hypertrophy. In all three groups of patients, atrial fibrillation was rare when left atrial dimension was below 40 mm (3 of 117 or 3%) but common when this dimension exceeded 40 mm (80 of 148 or 54%). In addition, when left atrial dimension exceeds 45 mm, cardioversion, while initially successful, is unlikely to produce sinus rhythm that can be maintained at least six months. These data suggest that left atrial size is an important factor in the development of atrial fibrillation and in determining the long term result of cardioversion. The pathophysiologic mechanism most consistent with this is that a chronic hemodynamic burden initially produces left atrial enlargement which in turn predisposes to atrial fibrillation. Only prospective studies will determine definitively whether these observations will be useful in decisions concerning prophylactic anticoagulation and elective cardioversion. (Author)

A76-20079 **The density of human rhodopsin in the rods.** F. Zwas and M. Alpern (Michigan, University, Ann Arbor, Mich.). *Vision Research*, vol. 16, no. 2, 1976, p. 121-127. 26 refs. Grant No. NIH-EY-00197.

The density of human rhodopsin in the rods has been estimated psychophysically by following the change in the relative quantum sensitivity for rod vision at two wavelengths (one near the peak, the other far off on the long wave tail of the action spectrum) in the dark after a full rhodopsin bleach in a region of a typical pi-o monochromat's retina where cones make no contribution to threshold. Metameric matching and dark adaptation curves yield results (about 0.75 ln units at 500 nm) consistent with recent densitometric estimates of Alpern and Pugh (1974) made on the normal retina. (Author)

A76-20080 **Psychophysical correlates of photoreceptor activity.** B. Sakitt (Stanford University, Stanford, Calif.). *Vision Research*, vol. 16, no. 2, 1976, p. 129-140. 36 refs. Grant No. PHS-EY-01336.

Results are presented for a psychophysical study of a rod monochromat and a normal subject as related to rod saturation, weak afterimages, and intense afterimages and dark adaptation following strong bleaches of rhodopsin. It is shown that the equivalent background light and the strong afterimage saturate at an intensity equivalent at about 1000 scotopic td. This lends support to Barlow's hypothesis that the equivalent background light is receptor activity that mimics the action of real quantal absorptions. There is enough evidence to confirm that strong afterimage is produced by a mechanism involving at least two stages. Strong afterimage seems to be best explained by photochemical kinetics, whereas weak afterimage can be explained by a waiting-in-line hypothesis. The rod photoreceptor signal is suggested to remain saturated for many minutes after an intense bleach is turned off. S.D.

A76-20081 **Luminance gradients and edge effects.** G. van den Brink and C. J. Keemink (Erasmus Universiteit, Rotterdam, Netherlands). *Vision Research*, vol. 16, no. 2, 1976, p. 155-159. 11 refs.

Experimental observations indicate that contradictory brightness sensations occur in the case of sawtooth light distributions. It is shown that identical adjacent fields with sawtooth luminance distributions are perceived as having different but homogeneous brightnesses, provided the luminance gradient is sufficiently low; the brightness difference disappears when the boundary between the two fields is covered. Although the existence of chromatic Mach bands is very doubtful, a chromatic sawtooth effect can easily be observed when two differently colored sawteeth are superimposed on a white field. The paradoxical fact that luminance steps result in brightness sawteeth and that luminance sawteeth result in brightness steps strongly suggests the existence of at least two different mechanisms. A hypothesis is advanced in which perception of different brightnesses is due to central processes at the level of interpretation and attention. S.D.

A76-20082 **The detection of coherence in moving random-dot patterns.** J. S. Lappin and H. H. Bell (Vanderbilt University, Nashville, Tenn.). *Vision Research*, vol. 16, no. 2, 1976, p. 161-168. 26 refs. Grant No. PHS-MH-21105.

If a random-dot pattern is presented in two successive displays in which the second is spatially displaced in relation to the first, then under certain conditions observers are able to accurately discriminate the direction of their apparent motion. The accuracy of detecting this coherent relationship between the two stimuli was found to be a rapidly decreasing function of their separation in space and time and an increasing function of the number of elements in the pattern. The visual system seems to utilize a process similar to cross-correlation to detect coherent, position-invariant patterns of stimulation. (Author)

A76-20083 **The spatial frequency effect on perceived velocity.** H. C. Diener, J. Dichgans, T. Brandt (Neurologische Universitätsklinik, Freiburg im Breisgau, West Germany), and E. R. Wist. *Vision Research*, vol. 16, no. 2, 1976, p. 169-176. 42 refs. Deutsche Forschungsgemeinschaft Grant No. SFB-70.

The effect of the spatial frequency of a vertically oriented, horizontally moving stripe pattern on perceived speed was investigated. Perceived velocity increased linearly with both angular speed and spatial frequency. The spatial frequency effect was independent of the relative angular width of light and dark stripes and was also found to apply to the case of a single moving bar. Evidence for weighted frequency averaging was obtained for more complex patterns. The results are consistent with a model involving both a spatial frequency dependent input mediated by temporal frequency and an angular speed input relating to the movement of a single edge through the visual field. (Author)

A76-20084 **Velocity-time reciprocity in the perception of motion - Foveal and peripheral determinations.** C. A. Johnson and H. W. Leibowitz (Pennsylvania State University, University Park, Pa.). *Vision Research*, vol. 16, no. 2, 1976, p. 177-180. 14 refs. Grant No. NIH-MH-8061.

Motion thresholds were determined for durations between 0.025 and 5 sec in the fovea and periphery. For intermediate durations of movement between 0.1 and 1.0 sec, threshold is determined by a constant displacement of the stimulus. For shorter and longer durations, threshold is determined by a fixed velocity. Similar characteristics are displayed by motion detection mechanisms in the fovea and periphery. The close correspondence between resolution and motion thresholds for intermediate durations in both the fovea and the perphery is discussed. (Author)

A76-20085 **The role of convergence in visual space perception.** C. von Hofsten (Uppsala, Universitet, Uppsala, Sweden). *Vision Research*, vol. 16, no. 2, 1976, p. 193-198. 14 refs. Research supported by the Statens Rad for Samhallsforskning.

Earlier experiments suggest that the perception of relative and absolute distance in binocular space is affected by the convergence angle to the stimulus. A hypothesis was proposed in which the obtained effects are accounted for in terms of convergence differences. The hypothesis states that binocular stimuli are related to the rest convergence of the eyes which is assumed to be stable. Two experiments were conducted in which distance estimations were made to single binocular dots, viewed through a polarization stereoscope. The experimental results support the proposed hypothesis. (Author)

A76-20122 * **A model of the human observer in failure detection tasks.** E. G. Gai (Charles Stark Draper Laboratory, Inc., Cambridge, Mass.) and R. E. Curry (MIT, Cambridge, Mass.). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-6, Feb. 1976, p. 85-94. 19 refs. Grant No. NGR-22-009-733.

A model for the human observer in failure detection tasks is proposed which consists of two stages: a linear estimator and a decision mechanism. The estimator is a Kalman filter, and the decision mechanism, which is based on Wald's sequential analysis, leads to a decision function which is the integration of the filter residuals. The final result is a simple detection system which depends on only three parameters, and the sensitivity of the model to these parameters is analyzed. The results of an experiment designed to test the validity of the model are reported. The question of open and closed decision intervals as well as the generalization of the model to more complicated cases is discussed. (Author)

A76-20123 **Vertical mode human body vibration transmissibility.** D. P. Garg (Duke University, Durham, N.C.) and M. A. Ross (Westinghouse Electric Corp., Pittsburgh, Pa.). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-6, Feb. 1976, p. 102-112. 28 refs. NIH-supported research.

Frequency response of standing humans subjected to sinusoidal vibration is presented. The vibratory input was a vertical displacement to the feet, and the output was the corresponding vertical response of the head. Twelve subjects (eight male and four female) were tested in the frequency range of 1-50 Hz with small input amplitudes (0.003 to 0.02 in.). The twelve experimentally obtained frequency response plots were averaged and a sixteen-mass linear lumped-parameter model was developed to match the average response in both magnitude and phase angle. This proposed matching model is analogous to human anatomy. Parametric values of mass distribution and joint stiffness available in the literature were incorporated in the model. Damping parameters for various joints in the human body were indirectly determined from this study. (Author)

A76-20238 **Dynamic damper in the biomechanical arm-vibrator system (Dinamicheskii gasitel' v biomekhanicheskoi sisteme ruka-vibrator).** M. V. Khvingiia (Akademiia Nauk Gruzinskoi SSR, Institut Mekhaniki Mashin, Tiflis, Georgian SSR) and A. S. Meliia (Gosudarstvennyi Institut Fizicheskoi Kul'tury, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 80, Oct. 1975, p. 125-128. In Russian.

The behavior of a biomechanical system represented by an extended stressed arm and composed of the elements upper arm-forearm-wrist-vibrator in a transient vibratory regime is examined. Based on an analysis of the oscillograms of this system, the model of the extended stressed arm attached to a vibrator may be regarded as consisting of the masses of the upper arm and forearm and the rigidities of the upper arm, forearm, and wrist, the mass of the wrist being attached to the infinitely large mass of the vibrator. A discussion of the mathematical model of this vibratory system reveals that the arm exhibits a correlation among its parameters which ensures its functioning as a damper of pertinent vibrations. S.D.

A76-20295 # **Effect of prolonged flights on the course of chronic sacrolumbar radiculitis in flying personnel (Vliianie dlitel'nykh poletov na techenie khronicheskogo poiasnichno-kresttsovogo radikulita u letnogo sostava).** V. M. Khromov and Iu. M. Bel'skii. *Voenno-Meditsinskii Zhurnal*, Nov. 1975, p. 71, 72. In Russian.

Results are presented for a two-year study of the symptomatology of chronic sacrolumbar radiculitis in aircrew members, aged 30-40, under the action of prolonged flights of 6 to 20 hr. A major aim of the study was to develop a system of protective measures devised to ensure a high capacity for work. Prolonged forced sitting position is found to lead to compression of the tissues in the sacrolumbar region; to mechanical, circulatory, and reflex-induced disorders; aggravation of ailment; and manifestation of painful sensations and functional disorders. Key protective measures include X-ray examination of the spine and special physical training directed to the elimination of relative hypodynamia encountered in aircrew members forced to maintain a restrained static sitting position for long periods of time. S.D.

A76-20296 # **Effect of working environment conditions on the X-ray pattern of paranasal sinuses in the technical personnel of air force units (Vliianie uslovii rabochei sredy na Rentgenologicheskuiu kartinu okolonosovykh pazukh tekhnicheskogo personala aviatsionnykh chastei).** B. Bembnovskii and V. Pavlitskii. *Voenno-Meditsinskii Zhurnal*, Nov. 1975, p. 77-79. 9 refs. In Russian.

Meteorological conditions, noise, chemical compounds, organic solvents, and concentrated acids and bases are known to have a detrimental effect on the organism of air force technical personnel. The most prevalent causes of the inflammation of paranasal sinuses are rhinitis and influenza. The X-ray pattern of paranasal sinuses is analyzed to determine whether working environment conditions affect the frequency of inflammatory processes. It is shown that changes in the X-ray pattern of paranasal sinuses occur in 30% of the technical personnel and that these changes are frequently due to the detrimental effects of both environmental and working conditions. The personnel most affected range in age between 30 and 40. Diagnostic and prophylatic measures to preserve the health of air force technical personnel forced to work outdoors are discussed. S.D.

A76-20322 **Muscle water and electrolytes following varied levels of dehydration in man.** D. L. Costill, R. Coté, and W. Fink (Ball State University, Muncie, Ind.). *Journal of Applied Physiology*, vol. 40, Jan. 1976, p. 6-11. 24 refs. Research supported by the Ball State University; Grant No. NIH-AM-17083-02.

In order to assess the effects of dehydration on the content of water and electrolytes in plasma and muscle tissue, eight men exercised in the heat (39.5 C, 25 percent). Blood, urine, and muscle biopsy samples were obtained before exercise and after the subjects had reduced their body weight by 2.2, 4.1, and 5.8 percent. On the average, plasma and muscle water contents were found to decline 2.4 and 1.2 percent for each percent decrease in body weight. Muscle sodium and chloride content remained unchanged with dehydration, while muscle magnesium declined 12 percent as a result of the 5.8 percent dehydration. In terms of intracellular concentrations, intracellular potassium increased 7.2 and 10.6 percent at the 2.2 and 4.1 percent dehydration levels, respectively. Calculations of the resting membrane potential suggest that the water and electrolyte losses observed in these studies do not significantly alter the excitability of the muscle cell membrane. (Author)

A76-20323 **Measurement of cardiac output by electrical impedance at rest and during exercise.** J. C. Denniston, J. T. Maher, J. T. Reeves, J. C. Cruz, A. Cymerman, and R. F. Grover (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.; Colorado, University, Medical Center, Denver, Colo.). *Journal of Applied Physiology*, vol. 40, Jan. 1976, p. 91-95. 30 refs. Grant No. PHS-HL-14985.

A comparison was made between cardiac output values determined by the dye dilution and electrical impedance methods in ten subjects at rest and during graded exercise on a bicycle ergometer.

The cardiac output values determined by the two methods were linearly related and significantly correlated (r = 0.90 for P less than 0.001). Movement artifact associated with exercise at maximum or near-maximum work loads caused severe distortion of the dZ/dt wave form and prevented calculation of impedance cardiac output at these levels of work. Use of the lowest value of L (distance between inner pair of impedance-measuring electrodes) rather than the mean value of L in the impedance stroke volume equation resulted in nearly identical values for the least-squares line and equal-value line of impedance and dye cardiac outputs. Changes in cardiac output were nearly identical during the different levels of exercise. The data support the validity of the impedance method as a noninvasive measure of cardiac output at rest and during graded exercise.

(Author)

A76-20324 **Sustained venoconstriction in man supplemented with CO2 at high altitude.** J. C. Cruz, R. F. Grover, J. T. Reeves, J. T. Maher, A. Cymerman, and J. C. Denniston (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.; Colorado, University, Medical Center, Denver, Colo.). *Journal of Applied Physiology*, vol. 40, Jan. 1976, p. 96-100. 29 refs.

This study sought to determine whether hypoxia or hypocapnia is the cause of venoconstriction at high altitudes. Five male subjects were exposed to 4000-4400 m with supplemental 3.77 + or - 0.02% CO2 in a hypobaric chamber for 4 days. Similar alveolar O2 tensions were obtained in four control subjects exposed to 3500-4100 m without CO2. A water-filled plethysmograph was used to determine forearm flow and venous compliance. Systemic blood pressure was measured with the cuff procedure. Catecholamines were measured in 24-h urine collections. Venous compliance fell at high altitude in both groups and was less than control values. Forearm flow and resistance were unaltered at altitude in the group with CO2 supplementation while forearm flow decreased and resistance increased in the hypocapnic group at 72 h of exposure. It is concluded that hypoxia is responsible for decreasing venous compliance, and hypocapnia for increasing resistance and decreasing flow. Group differences observed in urinary catecholamines may be explained by differences in arterial pH.

(Author)

A76-20350 **Rate of change of ventricular power An indicator of ventricular performance during ejection.** P. D. Stein and H. N. Sabbah (Oklahoma, University; U.S. Veterans Administration Hospital, Oklahoma City, Okla.). *(American Physiological Society, Annual Fall Meeting, 25th, Albany, N.Y., Aug. 13, 1974.) American Heart Journal*, vol. 91, Feb. 1976, p. 219-227. 18 refs. Research supported by the American Heart Association, Tulsa County Heart Association, and U.S. Veterans Administration; Grant No. NIH-LI-72-2921-B.

A mathematical formula indicative of the rate of change of ventricular power during ejection is developed for evaluation of ventricular performance. The formula is derived on the theoretical basis that the power generated by the ventricle during ejection is equal to the product of intraventricular pressure and aortic flow. The primary advantages of the formula are that the rate of change of ventricular power measured during ejection is free of assumptions and that it has a fluid dynamic and a physiological meaning. Studies in mongrel dogs indicate that the formula reflects alterations of the inotropic state, yet it is relatively independent of alterations of preload and afterload. It is also shown that for a ventricle of spherical configuration with a thin wall, the ejection rate of change of ventricular power is a function of tension, fiber length, rate of fiber shortening, and acceleration of fiber shortening.

S.D.

A76-20458 * **The gastrin antibody /IgG/ in the blood of healthy humans and animals (Antitela /IgG/ k gastrinu v krovi u zdorovykh liudei i zhivotnykh).** M. V. Polosatov, M. A. Samartsev, P. K. Klimov, and A. N. Prusakov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 225, Nov. 1, 1975, p. 235-237. 6 refs. In Russian.

Immunoelectrophoresis on agar was used to detect the presence of a gastrin antibody (IgG) in blood samples from dogs, rabbits, and humans. Conjugates of a synthetic pentagastrin with human serum albumin, egg albumin, and equine hemoglobin were used as antigens; the same proteins, free of pentagastrin, served as control antigens. All of the samples studied formed a precipitation band with the protein-pentagastrin conjugates but failed to react with the control antigen. Samples from rabbits immunized with conjugates of human albumin and pentagastrin precipitated more rapidly when exposed to the protein-pentagastrin conjugates, and an additional precipitation band formed with human albumin, indicating that immunization with pentagastrin stimulated the production of an antibody to gastrin. Results show that the activity of the gastric glands is subject to autoimmune regulation.

C.K.D.

A76-20615 * **Informational problems in flight ergonomy (Informacyjne problemy ergonomii lotniczej).** J. M. Morawski (Instytut Lotnictwa, Warsaw, Poland). *Technika Lotnicza i Astronautyczna*, vol. 31, Jan. 1976, p. 9-13. 16 refs. In Polish.

Survey of selected problems in flight cybernetics. Basic aspects of the aircraft system with the human operator in the closed loop, and optimum adaptation of the system (controls, display, responses) to the human operator and vice versa are discussed. The importance of semantic information theory, suitable models for the human operator plus machine system, and the importance of adapting the machine and display to the perceptions and reflexes of the human operator are emphasized. Landing operators are discussed separately as the most hazardous phase of flight. Training of crews, on-ground flight simulators, and improved training techniques are discussed.

R.D.V.

A76-20616 * **Evaluation of the load on a pilot's organism during agrotechnical flights, on the basis of physiological studies (Ocena obciazenia organizmu pilota podczas lotow agrotechnicznych na podstawie badan fizjologicznych).** L. Markiewicz, D. Koradecka, and M. Konarska (Centralny Instytut Ochrony Pracy, Warsaw, Poland). *Technika Lotnicza i Astronautyczna*, vol. 31, Jan. 1976, p. 13-16. In Polish.

Pilots engaged in flights in agricultural work at tree-hopping heights, performing dozens of flights in the course of one day, under a variety of weather conditions and with different machines in contrasting missions, are found to be frequently under severe emotional stress before takeoff and during the flight. Physiological variables studied included: heart rate on the basis of telemetered or conducted ECG data, strength and stamina of finger-flexing muscles (electrodynamometer data), the number of errors in a tremorometric test, testing response time, and threshold levels of vibration sensation. Comparative tests were conducted for pilots operating different aircraft, gliders, or helicopters in agricultural service. Shortcomings of the testing procedure are discussed. Three hours maximum consecutive flying time in agrotechnical flights are suggested, among other measures.

R.D.V.

A76-20666 **Oxygen diffusion in living tissues (Diffusion de l'oxygène dans les tissus vivants).** G. Duvaut (Paris VI, Université, Paris, France). *Académie des Sciences (Paris), Comptes Rendus, Série A - Sciences Mathématiques*, vol. 282, no. 1, Jan. 5, 1976, p. 33-36. In French.

The diffusion of oxygen in living tissues is studied as a free boundary problem whose global formulation is expressed by an elliptic variational inequality. It is shown that given certain boundary conditions the associated convexity depends on time. A priori estimates are given which lead to the proof of the existence and uniqueness of the solution. Several properties of the solution and its limit are given when t tends toward infinity.

B.J.

A76-20752 **Cardiovascular diagnosis with real time ultrasound imaging.** O. T. von Ramm, F. L. Thurstone, and J. Kisslo (Duke University, Durham, N.C.). In: International Symposium on Acoustical Holography and Imaging, 6th, San Diego, Calif., February

4-7, 1975, Proceedings. New York, Plenum Press, 1975, p. 91-102. 8 refs. Grants No. PHS-HL-14228; No. PHS-HL-12715; No. PHS-HL-17670; No. PHS-HS-01613.

A description is given of the operation of a real time imaging system which relies on phased array principles to steer and focus the ultrasound beam in the near field of a linear array of ultrasound transducers. The image frame rates of the system are suitable for cardiac dynamics. The field of view is sufficiently large for the formation of an image of the entire left ventricle or the greatest part of it. During initial clinical trials of this imaging system over 100 patients have been examined. G.R.

A76-20753 **Digital computer simulation study of a real-time collection, post-processing synthetic focusing ultrasound cardiac camera.** S. A. Johnson, J. F. Greenleaf, F. A. Duck, A. Chu, W. R. Samayoa, and B. K. Gilbert (Mayo Foundation, Rochester, Minn.). In: International Symposium on Acoustical Holography and Imaging, 6th, San Diego, Calif., February 4-7, 1975, Proceedings. New York, Plenum Press, 1975, p. 193-211. 20 refs. Navy-supported research; Grants No. NIH-HT-42904; No. NIH-RR-7; No. NIH-HL-04664.

A76-20755 * **Real-time Doppler imaging for unambiguous measurement of blood volume flow.** C. F. Hottinger and J. D. Meindl (Stanford University, Stanford, Calif.). In: International Symposium on Acoustical Holography and Imaging, 6th, San Diego, Calif., February 4-7, 1975, Proceedings. New York, Plenum Press, 1975, p. 247-258. 12 refs. Grants No. PHS-1-P01-GM-17940-04; Grant No. NGR-05-020-615.

A76-20772 * **Search for correlation between geomagnetic disturbances and mortality.** B. J. Lipa, P. A. Sturrock (Stanford University, Stanford, Calif.), and F. Rogot (National Institutes of Health, National Heart and Lung Institute, Bethesda, Md.). *Nature*, vol. 259, Jan. 29, 1976, p. 302-304. 10 refs. NSF-NASA-supported research.

A search is conducted for a possible correlation between solar activity and myocardial infarction and stroke in the United States. A statistical analysis is performed using data on geomagnetic activity and the daily U.S. mortality due to coronary heart disease and stroke for the years 1962 through 1966. None of the results are found to yield any evidence of a correlation. It is concluded that correlations claimed by Soviet workers between geomagnetic activity and the incidence of various human diseases are probably not statistically significant or probably are not due to a causal relation between geomagnetic activity and disease. F.G.M.

A76-20853 **Effects of luminance and stimulus distance on accommodation and visual resolution.** C. A. Johnson (Pennsylvania State University, University Park, Pa.). *Optical Society of America, Journal*, vol. 66, Feb. 1976, p. 138-142. 40 refs. Grant No. NIH-MH-08061.

Measurements of accommodation and visual resolution were obtained at a number of luminance levels and stimulus distances. With reductions in luminance, the eye approached a 'fixed-focus' condition of accommodation for intermediate distances, resulting in successively larger errors in accommodation for both near and far stimuli. The visual resolution values were initially affected by both the luminance and distance of the stimulus. Subsequent measurements of resolution, following the correction of accommodative errors, were found to be independent of the stimulus distance. The findings are discussed with regard to the problems of 'night myopia' and variations in visual resolution with stimulus distance. (Author)

A76-20856 **Pupil size and stereoacuity.** S. M. Luria (U.S. Naval Material Command, Naval Submarine Medical Research Laboratory, Groton, Conn.). *Optical Society of America, Journal*, vol. 66, Feb. 1976, p. 157-159. 13 refs.

The effect of pupil size on stereoacuity is investigated. An experiment is described in which a subject observed the middle portion of three vertical black rods through artificial pupils. The middle rod was movable, and the specific measure of stereoacuity was the variability of the setting which the subject made when he judged the middle rod to be the same distance from him as the two outer rods. The results for ten subjects show that the mean variability decreased as pupil size increased, but increased again as pupil diameter increased from 4 to 6 mm. These results suggest that both spherical aberrations (with large pupil diameters) and diffraction (with smaller pupils) interfere with stereoacuity in the same way that they interfere with visual acuity. F.G.M.

A76-20859 **Differential responding to the beta movement after waking from REM and nonREM sleep.** P. Lavie and D. Sutter (Florida, University, Gainesville, Fla.). *American Journal of Psychology*, vol. 88, Dec. 1975, p. 595-603. 19 refs.

An experimental study was performed to determine the upper and lower beta-movement thresholds in ten male and female subjects aged 18-21 yr who were wakened from REM sleep and from nonREM sleep on two nonconsecutive nights. The beta movement was obtained by successively exposing two stimuli at a short distance apart. Results support the experimental hypothesis that the beta movement is sensitive to wakings from REM and nonREM sleep. Differential responding to the beta movement suggests that apparent motion may provide sensitive detectors of the operation during wakefulness of the basic rest-activity cycle, of which REM and nonREM sleeps are opposite phases that carry over into wakefulness. S.D.

A76-20875 # **On the question of the physiological interaction on the vibrotactile and audio reception (K voprosu o fiziologicheskom vzaimodeistvii vibrotaktil'noi i slukhovoi retseptsii).** Iu. V. Krylov. *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia*, Nov.-Dec. 1975, p. 930-932. 10 refs. In Russian.

It has been found experimentally that action on the vibrotactile endings of the skin of a local vibration with a frequency equal to 125 Hz at an intensity of 40 dB leads to a sensibilization of hearing by 3-6 dB in a wide frequency range (125-10,000 Hz). This fact should be taken into consideration while estimating the effectivity of individual antinoises under conditions of a complex influence upon man of noises and vibration. (Author)

A76-21054 * **Role of arterial baroreceptors in mediating cardiovascular response to exercise.** R. J. McRitchie, S. F. Vatner, T. A. Patrick, E. Braunwald (Harvard University, Cambridge; Peter Bent Brigham Hospital; Children's Hospital Medical Center, Boston; New England Regional Primate Research Center, Southborough, Mass.), D. Boettcher, and G. R. Heyndrickx. *American Journal of Physiology*, vol. 230, Jan. 1976, p. 85-89. 17 refs. Research supported by the American Heart Association and NASA; Grants No. PHS-HL-15416; No. PHS-HL-17549; No. PHS-HL-10436-09.

Experiments were conducted to define the role of the major arterial baroreceptors during moderately severe exercise by comparing the responses of untethered conscious dogs instrumented for the measurement of aortic pressure and cardiac output with those of dogs with total arterial baroreceptor denervation. The reflex heart rate responses to intravenous bolus doses of methoxamine were also examined in intact animals, both at rest and during exercise. Methoxamine is found to cause striking bradycardia at rest, but little bradycardia during exercise. Experimental findings suggest that the arterial baroreceptor reflex is normally inhibited during severe exercise and therefore plays little role in modulating the cardiovascular response to exercise. S.D.

A76-21055 **Mechanism of the inhibition of myocardial protein synthesis during oxygen deprivation.** M. Lesch, H. Taegtmeyer, M. B. Peterson, and R. Vernick (Harvard University, Cambridge; Peter Bent Brigham Hospital, Boston, Mass.). *American Journal of Physiology*, vol. 230, Jan. 1976, p. 120-126. 25 refs. Grants No. PHS-11306; No. PHS-2-R01-HE-09714; No. NIH-5-T1-HE-5890-02.

An experimental study was carried out on the isolated rabbit

right ventricular papillary muscle preparation for a more specific determination of the relation of alterations in adenine nucleotide and oxidative metabolism to the apparent translational inhibition of myocardial protein synthesis during anoxia and to the mechanism by which glucose retards irreversible inhibition of protein synthesis during anoxia. Tissue content of ATP, ADP, AMP, CP, and lactate and phenylalanine incorporation into protein were measured. It is shown that anoxic inhibition of myocardial protein synthesis is due neither to high-energy phosphate depletion nor inhibition of Krebs cycle activity. Inhibition may be related to accumulation of glycolytic intermediates or by-products other than lactate. S.D.

A76-21148 * **Biothermal simulation of scuba divers.** L. D. Montgomery (NASA, Ames Research Center, Moffett Field, Calif.). *Aviation, Space, and Environmental Medicine*, vol. 46, June 1975, p. 814-818. 12 refs. NASA-supported research.

A biothermal model of the immersed man is presented and validated. Comparisons are made between analytic and experimental values of temperature-vs-time profiles for neck-immersed seminude and wet-suited subjects. An engineering example is presented to demonstrate how the model may be used to evaluate proposed life-support system designs. (Author)

A76-21251 **An assessment on certain causal models used in surveys on aircraft noise annoyance.** A. Alexandre (Organization for Economic Co-operation and Development, Paris, France). *Journal of Sound and Vibration*, vol. 44, Jan. 8, 1976, p. 119-125. 11 refs.

The causal relationships which have so far been proposed between aircraft noise exposure, annoyance and certain 'psycho-social' variables (fear of aircraft crashing, general attitude towards aviation, etc.), are re-analysed, and it is demonstrated that by using correlational analysis one can arrive at contradictory results. From the sociological surveys undertaken to date, one can derive only an ordered sequence of verbal reactions to aircraft noise, and not a causal sequence between these verbal reactions: the only clear cause of annoyance is the noise itself. It is suggested that future surveys on noise annoyance should include personality tests and health questionnaires, if one wishes to establish reliable causal sequences. (Author)

A76-21317 **Antagonism between channels for pattern and movement in human vision.** M. Georgeson (Sussex, University, Brighton, England). *Nature*, vol. 259, Feb. 5, 1976, p. 413-415. 13 refs. Research supported by the Science Research Council.

A model explaining the streaming hallucination discovered by MacKay (1957, 1958) is proposed. It is suggested that the effect is produced by mutual antagonism between three types of channel contained in each orientation column of the visual cortex; sustained (pattern) channels are assumed to inhibit movement channels and vice versa. Adapting out one or two channels produces a 'hallucinated' after-effect based on the disinhibited or rebound response(s) of the remaining channel(s). After adaptation to stationary vertical stripes there is a temporary increase in the outputs of the horizontal movement channels and horizontal streaming appears. After observation of moving stripes one of the movement channels is also adapted. Since only the opposite movement channel is released from inhibition, streaming is seen in that direction only. Several additional subjective after-effects predicted by the model have been confirmed experimentally. C.K.D.

A76-21318 **Identification of beta carbolines isolated from fluorescent human lens proteins.** J. Dillon, A. Spector, and K. Nakanishi (Columbia University, New York, N.Y.). *Nature*, vol. 259, Feb. 5, 1976, p. 422, 423. 14 refs. NIH-supported research.

Preparative paper electrophoresis at pH 1.9 following alkaline degradation of either the insoluble protein fraction or the high molecular weight (HMW) fraction obtained from cataractous human lenses yielded a number of fluorescent components. The structure of the principal fluorescent component, designated C(1), has been investigated and its relationship to the fluorescent material present in the lens proteins examined. Results suggest that C(1) is a mixture of tryptophan derivatives, specifically two 3,4 dihydro-beta-carboline-3-carboxylic acids. C(1) has a yellow fluorescence when observed by long wavelength UV, is unstable, and decomposes to two components characterized by a blue fluorescence. Protein obtained from 45 and 77 year old human lenses contained these decomposition products. None of these components was detected in the protein of young human or calf lenses, suggesting an age-dependent formation of the beta-carboline skeleton. C.K.D.

A76-21319 **Light-induced fast conformational change in all-trans-retinal at low temperature.** S. Georghiou (Tennessee, University, Knoxville, Tenn.). *Nature*, vol. 259, Feb. 5, 1976, p. 423, 424. 13 refs. NIH-supported research.

The nanosecond fluorescence properties of all-trans-retinal in a nonpolar matrix at 100 K were ascertained using a fluorometer with a boxcar averager. The form of fluorescent decay was found to be strongly dependent on the emission wavelength, remaining non-exponential up to about 510 nm. At longer wavelengths the decay was virtually single exponential and independent of the emission wavelength. The time-resolved fluorescence spectra showed a broadening with time in the nanosecond range; the spectral maximum and the long wavelength portion of the spectrum were invariant with time. It is suggested that the observed time- and emission wavelength-dependent phenomena are due to a relaxation process in the excited state resulting from rotation of the polyene chain about the C6-C7 bond. C.K.D.

A76-21401 **Intracardial bubbles during decompression to altitude in relation to decompression sickness in man.** U. I. Balldin and P. Borgstrom (Lund, Universitet, Lund, Sweden). *Aviation, Space, and Environmental Medicine*, vol. 47, Feb. 1976, p. 113-116. 10 refs. Research supported by the Forsvarets Forskningsanstalt. FOA Project 5405,1-010.

Doppler ultrasound was used in five subjects to detect intracardial gas bubbles during decompression to altitude. At a simulated altitude of 8,000 m, neither intracardial bubbles nor symptoms of decompression sickness occurred. At 9,000 m, bubbles were registered in two subjects, one of which had questionable bends. At 11,500 m, bubbles were registered in all but one subject and two had bends. The three subjects who had not gotten bends were exposed to an air-breathing period of 30 min or, in one case, even 45 min at 2 ATA, for extra nitrogen loading, followed by decompression to 11,500 m. These subjects had heavy showers of bubbles followed by bends. In all cases with decompression sickness during the decompressions to altitude, intracardial bubbles were registered prior to the appearance of symptoms. The technique may be used in studies of decompression sickness without provoking actual symptoms, thus making the studies safer. (Author)

A76-21402 **Effect of physical activity of airline flight attendants on their time of useful consciousness in a rapid decompression.** D. E. Busby, E. A. Higgins, and G. E. Funkhouser (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aviation, Space, and Environmental Medicine*, vol. 47, Feb. 1976, p. 117-120. 12 refs.

To determine the effect of physical activity on the 'time of useful consciousness' TUC of airline flight attendants in a rapid, severe decompression, 10 male and 10 female subjects were exposed to a decompression profile while at rest and performing light-to-moderate work. Decompression from 6,500 to 34,000 ft (2,000 to 10,400 m) was followed by descent at 5,000 ft/min (1,500 m/min). The average TUC for the males decreased from 54 s at rest to 34 s while performing work. The average TUC for the females decreased from 54 s at rest to 32 s while performing work. Supplemental oxygen had a marked paradoxical effect when the subjects were performing work. (Author)

A76-21403 **Interaction between marihuana and altitude on a complex behavioral task in baboons.** M. F. Lewis, H. W. Mertens, J. A. Steen (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.), and D. P. Ferraro (New Mexico, University, Albuquerque, N. Mex.). *Aviation, Space, and Environmental Medicine*, vol. 47, Feb. 1976, p. 121-123. 9 refs.

A76-21404 **Simulated flying performance after marihuana intoxication.** D. S. Janowsky, M. P. Meacham, J. D. Blaine, M. Schoor, and L. P. Bozzetti (California, University, La Jolla, Calif.). *Aviation, Space, and Environmental Medicine*, vol. 47, Feb. 1976, p. 124-128. 15 refs. Research supported by the U.S. Veterans Administration.

A76-21405 **Circulatory response to acute hypobaric hypoxia in conscious dogs.** S. B. Saltz, G. A. Beller, S. R. Giamber, and J. S. Alpert (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.; U.S. Navy, Naval Regional Medical Center, San Diego, Calif.). *Aviation, Space, and Environmental Medicine*, vol. 47, Feb. 1976, p. 129-132. 21 refs. Navy-supported research.

Hemodynamics were studied in seven conscious dogs during acute hypobaric stress at 14,000 ft simulated altitude. Pulmonary and central aortic pressures, cardiac output, and pulmonary blood volume were determined under conditions of normoxia and acute hypoxia in a hypobaric chamber maintained at 446 mm Hg pressure (14,000 ft). Significant increases in heart rate, cardiac output, pulmonary blood volume, and pulmonary artery pressure were observed. Left atrial pressure and calculated systemic vascular resistance decreased during hypobaric hypoxia while stroke volume, stroke work index, arterial pressure and pulmonary vascular resistance remained unchanged. The arterial oxygen tension decreased markedly at altitude, and all animals hyperventilated with resultant systemic hypocarbic alkalosis. The combination of elevated pulmonary arterial pressure and increased pulmonary blood volume may be an etiologic factor in the development of high-altitude pulmonary edema. (Author)

A76-21406 **Alpha index and personality traits of pilots.** J. Terelak (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Aviation, Space, and Environmental Medicine*, vol. 47, Feb. 1976, p. 133-136. 20 refs.

This investigation was instituted to provide information regarding the relationship between individuals with radically different alpha indices (low vs high) and personality traits of the subjects. EEG recordings were obtained and acceptable diagnostic personality testing techniques administered. The results indicate that the group with low alpha index revealed a significantly higher level of anxiety and neuroticism. (Author)

A76-21407 **Effect of a reduction in arterial oxygen content /carbon monoxide/ on coronary flow.** S. H. Young and H. L. Stone (Texas, University, Galveston, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 47, Feb. 1976, p. 142-146. 25 refs. Grants No. PHS-HL-05940; No. NIH-HL-14828.

Mongrel dogs were chronically instrumented for ventricular pacing, to measure left circumflex coronary flow (CF), left ventricular and arterial pressure, and to obtain blood samples from the left atrium and coronary sinus. Following a 3- to 4- week recovery period, the animals were subjected to a 30% reduction in arterial

A76-21408 **Effect of dietary 'antioxidant' supplementation on the susceptibility to oxygen toxicity in mice.** C. Schatte and A. Swansinger (Colorado State University, Fort Collins, Colo.). *Aviation, Space, and Environmental Medicine*, vol. 47, Feb. 1976, p. 147-150. 22 refs. Contract No. N00014-67-A-0299-0022.

This study was undertaken to test chronic feeding of some normal dietary constituents on susceptibility to oxygen toxicity. Eight-week-old male mice were fed a semi-purified diet simulating that of the average American male and supplemented with either vitamin E, vitamin K3, selenium, or the sulfur amino acids methionine and cystine. After 2, 4, 8, or 16 weeks, groups of mice were exposed to oxygen at 1, 4, or 8 ATA and times to respiratory distress, convulsion, and death recorded. Vitamin E and amino acid supplementation had no effect whereas vitamin K and selenium supplements increased time to death at 1 ATA. Only the effect of selenium was statistically significant. All diets significantly increased the time of onset of the measured parameters beginning after 4 weeks, suggesting that one or more constituents of the basal diet afforded some protection against oxygen toxicity. (Author)

A76-21409 **Evaluating the ability of aircrew personnel to hear speech in their operational environments.** C. E. Williams, J. D. Mosko, and J. W. Greene (U.S. Naval Aerospace Medical Center, Pensacola, Fla.). *Aviation, Space, and Environmental Medicine*, vol. 47, Feb. 1976, p. 154-158. 5 refs. Navy-supported research.

High-quality tape recordings were constructed of single, double, and triple word test items from the six monosyllabic word lists of the Modified Rhyme Test (MRT), a multiple-choice intelligibility test. The test words were incorporated in a carrier phrase somewhat analogous to typical aircraft radio messages. The recorded lists were mixed with shaped noise and played back to a group of listeners at three speech-to-noise ratios. The regular closed-response format of the MRT was utilized for all three types of test items. There was little difference in overall listener performance for the single, double, and triple word test items. Because of their more representative message length and decreased testing time, the triple word test items will be utilized in subsequent data-gathering studies directed toward the development of an efficient reliable test for assessing the ability of aircrew personnel to hear speech in their operational environments. (Author)

A76-21410 * **Perception of static orientation in a constant gravitoinertial environment.** C. C. Ormsby and L. R. Young (MIT, Cambridge, Mass.). *Aviation, Space, and Environmental Medicine*, vol. 47, Feb. 1976, p. 159-164. 20 refs. Grant No. NGR-22-009-701.

The illusions associated with the perception of static tilt in various specific force environments have been reviewed and then classified in such a way that a simple perceptual model could be developed to account for the experimental data. The fundamental conclusion to be drawn from this model is that these illusions can be accounted for by a simple nonlinear transformation of the information primarily from the saccule. (Author)

A76-21411 * **Pulmonary function evaluation during the Skylab and Apollo-Soyuz missions.** C. F. Sawin, A. E. Nicogossian, J. A. Rummel, and E. L. Michel (NASA, Johnson Space Center, Biomedical Research Div., Houston, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 47, Feb. 1976, p. 168-172. 18 refs.

Previous experience during Apollo postflight exercise testing indicated no major changes in pulmonary function. Pulmonary function has been studied in detail following exposure to hypoxic and hyperoxic normal gravity environments, but no previous study has reported on men exposed to an environment that was both normoxic at 258 torr total pressure and at null gravity as encountered in Skylab. Forced vital capacity (FVC) was measured during the preflight and postflight periods of the Skylab 2 mission. Inflight measurements of vital capacity (VC) were obtained during the last 2 weeks of the second manned mission (Skylab 3). More detailed pulmonary function screening was accomplished during the Skylab 4 mission. The primary measurements made during Skylab 4 testing included residual volume determination (RV), closing volume (CV), VC, FVC and its derivatives. In addition, VC was measured in flight at regular intervals during the Skylab 4 mission. Vital capacity was decreased slightly (-10%) in flight in all Skylab 4 crewmen. No major preflight-to-postflight changes were observed. The Apollo-Soyuz Test Project (ASTP) crewmen were studied using equipment and procedures similar to those employed during Skylab 4. Postflight

evaluation of the ASTP crewmen was complicated by their inadvertent exposure to nitrogen tetroxide gas fumes upon reentry. (Author)

A76-21412 Associations between psychological factors and pulmonary toxicity during intermittent oxygen breathing at 2 ATA. R. J. Biersner, D. A. Hall, and P. G. Linaweaver (U.S. Navy, Submarine Development Group One, San Diego, Calif.). *Aviation, Space, and Environmental Medicine*, vol. 47, Feb. 1976, p. 173-176. 7 refs.

A76-21413 Cross-validation study of the personality aspects of involvement in pilot-error accidents. M. G. Sanders, M. A. Hofmann, and T. A. Neese (U.S. Army, Aeromedical Research Laboratory and Agency for Aviation Safety, Fort Rucker, Ala.). *Aviation, Space, and Environmental Medicine*, vol. 47, Feb. 1976, p. 177-179.

Sanders and Hofmann (1975) found that three factors from Cattell's Sixteen Personality Factor Questionnaire (16 PF) distinguished between pilot-error accident groups. These were used to correctly classify 86% of the aviators tested as to their previous pilot-error accident involvement. There were 66 aviators given the 16 PF in the present study in an attempt to cross-validate the findings reported in the original study. The results indicate that the personality factors did not significantly discriminate between the pilot-error accident groups. The primary personality differences between the present sample and the original sample were due to variations in the pilot-error accident-free groups. The findings indicate that individual differences in personality characteristics of the aviators prevent consistent identification of traits associated with pilot-error groups. (Author)

A76-21414 Preemployment and periodic physical examination of airline pilots at the Mayo Clinic, 1939-1974. R. R. Orford and E. T. Carter (Mayo Clinic and Mayo Foundation, Rochester, Minn.). *Aviation, Space, and Environmental Medicine*, vol. 47, Feb. 1976, p. 180-184. 15 refs.

A descriptive study of medical disqualifications and deaths in an airline pilot population revealed that, of 2,751 pilot applicants, 145 were rejected by the preemployment company medical examination. Of the 145, 117 were rejected because of a primary disqualifying 'laboratory' abnormality. During the lifetime of the airline, 103 pilots have retired because of medical reasons, primarily cardiovascular, and 120 have died, the majority in aircraft accidents. The rate of medical disqualification is minimal before the age of 45 years, but it increases rapidly thereafter. It was determined that the chance of a pilot reaching retirement age in this airline company was less than 50%, although his chance of not reaching retirement age because of medical reasons was only 20%. Based on the results of this study, a departure from the 'traditional' periodic company medical examination program is suggested. (Author)

A76-21415 Paroxysmal and chronic atrial fibrillation in airman certification. D. E. Busby and A. W. Davis (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aviation, Space, and Environmental Medicine*, vol. 47, Feb. 1976, p. 185, 186. 5 refs.

Of the 757,693 airmen with valid FAA medical certificates on Oct. 31, 1974, 125 (all males but one) had a history of paroxysmal atrial fibrillation. Episodes of paroxysmal atrial fibrillation occurred once in 91, twice in 14, and more than twice in 20 airmen, and were attributed to one or more of 23 factors in 72 of the medical records studied. Associated symptoms reported in 27 records were considered serious enough to produce pilot incapacitation. Chronic atrial fibrillation was idiopathic in all but one airman, who developed this arrhythmia following atrial septal defect repair. Medical records report no associated symptoms, and heart rates, resting and in response to exercise, were reported as within normal limits. (Author)

A76-21603 Effect of intramyocardial pressure on the phasic flow in the intraventricular septal artery. T. E. Carew and J. W. Covell (California, University, La Jolla, Calif.). *Cardiovascular Research*, vol. 10, Jan. 1976, p. 56-64. 18 refs. Grant No. NIH-HL-12373.

Phasic flow in the intraventricular septal artery (SA) was measured by an electromagnetic flowmeter in anaesthetized dogs. The ratio of systolic to diastolic flow was less in the intramyocardial artery than in an epicardial (circumflex) artery. The SA systolic to diastolic ratio was further depressed when elevations in intramyocardial pressure were produced. These studies lend insight into the relationships between intramyocardial pressure and coronary arterial flow. (Author)

A76-21604 The accuracy of cardiac function indices derived from ultrasonic time-position scans. D. H. Evans (Leicester Royal Infirmary, Leicester, England), W. N. McDicken (Royal Infirmary, Edinburgh, Scotland), and D. A. R. Robertson (Southern General Hospital, Glasgow, Scotland). *Cardiovascular Research*, vol. 10, Jan. 1976, p. 65-73. 11 refs.

A study has been made of time-position ultrasonic scanning as a means of obtaining measurements related to cardiac performance. The errors involved in determining these measurements have been estimated. It has been shown that the greatest accuracy can be achieved for quantities which depend on action rather than shape, such as ejection fractions and rates of myocardial fiber shortening. Attention is drawn to the fact that the ultrasonic method, unlike angiography, in no way alters the quantities being measured. (Author)

A76-21605 Failure of carbon monoxide to induce myocardial infarction in cholesterol-fed cynomolgus monkeys /Macaca fascicularis/. M. R. Malinow, P. McLaughlin, D. S. Dhindsa, J. Metcalfe, A. J. Ochsner, III, J. Hill, and W. P. McNulty (Oregon Regional Primate Research Center, Beaverton; Oregon, University, Portland, Ore.). *Cardiovascular Research*, vol. 10, Jan. 1976, p. 101-108. 32 refs. Research supported by the Oregon Heart Association and American Medical Association; Grants No. NIH-FR-00163; No. NIH-HL-14124.

A76-21606 Effects of drugs on the negative /backflow/ component of velocity patterns in the dog aorta. P. A. Kot and J. C. Rose (Georgetown University, Washington, D.C.). *Cardiovascular Research*, vol. 10, Jan. 1976, p. 119-123. 11 refs. Research supported by the American Heart Association and Washington Heart Association; Grants No. PHS-RR-5360; No. PHS-RR-5306.

Changes in the aortic flow and velocity patterns resulting from regional alterations in vascular resistance caused by injections with several vasoactive agents in the brachiocephalic artery and/or in the descending thoracic aorta immediately distal to the flow cell were studied in anaesthetized mongrel dogs. Flow measurement was made at the descending thoracic aorta, a site which reflected the sum of regional changes in vascular resistance. Injected into the brachiocephalic artery, vasopressors prevented development of a significant negative component, while vasodilators caused increased backflow. Injected distal to the flow cell, vasopressors caused significant backflow, while vasodilators raised the level of the lowest part of the pulsatile flow curve. Increase in the negative component was most pronounced during periods when the arterial blood pressure was rising or falling, suggesting that during circulatory adjustments, there is a temporary differential in the vascular resistances of the upper and lower portions of the arterial circulation. P.T.H.

A76-21610 Sudden interruption of leaflet opening by ventricular contractions - A mechanism of mitral regurgitation. A. G. Tsakiris, D. A. Gordon, Y. Mathieu, R. Padiyar, and C. Labrosse (Sherbrooke, Université, Sherbrooke, Quebec, Canada). *Journal of Applied Physiology*, vol. 40, Feb. 1976, p. 132-137. 9 refs. Research supported by the Joseph C. Edwards Foundation and Quebec Heart Foundation; Medical Research Council of Canada Grant No. MA-4159.

A76-21611 **Effects of exercise on excretion rates of urinary free cortisol.** A. Bonen (Illinois, University, Champaign, Ill.). *Journal of Applied Physiology*, vol. 40, Feb. 1976, p. 155-158. 21 refs. Research supported by the University of Illinois.

A76-21612 **Arterial pressure contour analysis for estimating human vascular properties.** T. B. Watt, Jr. and C. S. Burrus (U.S. Veterans Administration Hospital; Baylor University; Rice University, Houston, Tex.). *Journal of Applied Physiology*, vol. 40, Feb. 1976, p. 171-176. 16 refs. Grants No. PHS-HL-05435; No. PHS-HL-10400; No. PHS-RR-259.

The form of an arterial blood pressure curve during the diastolic portion of the cardiac cycle was employed to identify parameters in a third-order model of the vascular system. Calculated elastic and inertial characteristics of this fitted model became clinically accessible indices of corresponding real vascular properties. This technique incurred no risk and little discomfort for the patient. Tested in theory, in animal experimentation, and in human observations, the procedure utilized a Gauss-Newton algorithm via digital computer to provide rapid model solutions from different starting values, from multiple measurement sites, and from normal or diseased patients. Model parameters thus determined defined ranges of normal variation and suggested a less compliant arterial bed in hypertensive than in normotensive patients. (Author)

A76-21613 **Respiratory volume-time relationships during resistive loading in the cat.** F. W. Zechman, D. T. Frazier, and D. A. Lally (Kentucky, University, Lexington, Ky.). *Journal of Applied Physiology*, vol. 40, Feb. 1976, p. 177-183. 13 refs. Grant No. NIH-HL-16878-01.

A76-21614 **Total and regional cerebral blood flow during moderate and severe exercise in miniature swine.** D. L. Foreman, M. Sanders, and C. M. Bloor (California, University, La Jolla, Calif.). *Journal of Applied Physiology*, vol. 40, Feb. 1976, p. 191-195. 39 refs. Research supported by the San Diego County Heart Association; Grant No. NIH-HL-12372.

The tracer microsphere method is used to measure total and regional cerebral blood flow during moderate and severe exercise-induced stress on a treadmill in miniature swine aged 6-9 months and weighing about 25 kg, in conjunction with assessment of blood gases, pH, catecholamines, potassium, and blood lactate. In addition, the ratio of blood flow to gray and white matter is evaluated. Results indicate that no significant decrease in cerebral blood flow (CBF) occurs despite a sharp decrease in arterial P(CO2), that CBF in the miniature swine both at rest and during exercise resembles that reported in humans, that regional blood flow distribution in the brain is not significantly affected by exercise, and that the gray matter of the brain receives significantly more blood than the white matter. S.D.

A76-21615 **Comparative evaluation of pressure and time factors in estimating left ventricular performance.** F. L. Abel (Indiana University, Indianapolis, Ind.; South Carolina, University, Columbia, S.C.). *Journal of Applied Physiology*, vol. 40, Feb. 1976, p. 196-205. 24 refs. Research supported by the American Heart Association; Grants No. NIH-HL-10659; No. NIH-5-S01-RR-5371; No. NIH-HL-14921.

A76-21616 **Effects of hypoxia, heat, and humidity on physical performance.** S. Lahiri, C. A. Weitz, J. S. Milledge, and M. C. Fishman (Pennsylvania, University; Temple University, Philadelphia, Pa.; Christian Medical College, Vellore, India). *Journal of Applied Physiology*, vol. 40, Feb. 1976, p. 206-210. 15 refs. World Health Organization Grant No. SOH-088/1968; Grant No. NIH-HL-08805.

A comparative study is made of the physical performance capacities between subjects at high altitude (3800 m) and at sea level in temperate and hot-humid environments on the basis of measurements of oxygen uptake under various work rates. The results obtained clearly show that the physical performance capacity of man is limited both in hot-humid environment at sea level and in hypoxic environment at high altitude as compared to those in a temperate environment at sea level. In a hot and humid environment, both ventilation and heart rate for a given oxygen uptake are found to be greater than those observed in a temperate climate. It is shown that by limiting maximal cardiac performance, hypoxia is the primary factor responsible for the low performance capacity of high-altitude sojourners. A similar argument applies to the restricted oxygen uptake of the high-altitude residents, although their working capacities are greater than those of the sojourners. Fortunately, in nature, hypoxia does not coexist with heat and humidity. S.D.

A76-21617 **An inexpensive blood pressure-heart rate computer for laboratory or teaching use.** P. Martin (Mt. Sinai Hospital; Case-Western-Reserve University, Cleveland, Ohio). *Journal of Applied Physiology*, vol. 40, Feb. 1976, p. 253-255. Grants No. PHS-RR-05658; No. PHS-HL-15758.

A special-purpose analog computer circuit is described that, given a signal proportional to arterial blood pressure, generates signals equal to systolic, diastolic, pulse, and mean pressure at a calibration of 100 mm Hg/V. Heart period and rate are also derived at calibrations of 1 s/V and 100 bpm/V, respectively. The outputs are step-function beat-by-beat changes in these six variables suitable either for analog recording, or presentation to a panel meter for digital display. (Author)

A76-21619 **The effect of two-axis vibration on the legibility of reading material.** R. D. L. Meddick and M. J. Griffin (Southampton, University, Southampton, England). *Ergonomics*, vol. 19, Jan. 1976, p. 21-33. 11 refs.

The result of combining equal amplitude and frequency vertical and horizontal sinusoidal motions with the proper phase is a circular motion. An experiment is described for determining whether reading errors due to circular motion are the same or greater than those due to the separate motion of the two components producing the circular motion. The experiment was performed on nine subjects who were required to read vibrating arrays of one hundred digits. It is shown that when two single-axis sinusoidal motions are combined to produce a circular motion there is a considerable decrease in the legibility of the vibrated material. This confirms the hypothesis that under the single-axis condition, it is the nodal images that enable the eye to detect detail in an object vibrating at frequencies above 3 Hz. With a circular motion, the absence of nodal images is presumably the cause of the increased illegibility. In addition, the time taken to read the digits was greatly increased when they were subjected to circular motion. Many reading errors are due to confusion between digits that appear similar when vibrating. S.D.

A76-21745 **The induced asynchrony effect - Its role in visual judgments of temporal order and its relation to other dynamic perceptual phenomena.** C. E. Collyer (Princeton University, Princeton, N.J.). *Perception and Psychophysics*, vol. 19, Jan. 1976, p. 47-54. 11 refs.

An apparent temporal ordering of two simultaneous light onsets has been observed following the anachronous offsets of two other lights, an effect termed the induced asynchrony effect (IAE). When the leftmost light was extinguished first, left first onset ordering was observed; opposite results were obtained when the right light was extinguished first. The joint effect of a real stimulus onset asynchrony and a preceding stimulus offset asynchrony is apparently additive, giving a Gaussian transformation of response probability. A simple statistical decision model is developed, and the IAE is compared with three other dynamic perceptual phenomena: the tau effect, the kappa effect, and a simple form of the rabbit effect. It is suggested that these effects may reflect a tendency of observers to perceive the velocity of apparent motion as constant. (Author)

A76-21746 **Effects of graded doses of alcohol on speed-accuracy tradeoff in choice reaction time.** J. R. Jennings, C. C. Wood, and B. E. Lawrence (U.S. Army, Walter Reed Army Institute of Research, Washington, D.C.). *Perception and Psychophysics*, vol. 19, Jan. 1976, p. 85-91. 30 refs.

A76-21747 **Speed-accuracy tradeoff functions in choice reaction time - Experimental designs and computational procedures.** C. C. Wood and J. R. Jennings (U.S. Army, Walter Reed Army Institute of Research, Washington, D.C.). *Perception and Psychophysics*, vol. 19, Jan. 1976, p. 92-102. 29 refs.

A76-21776 **Construction, simulation, clinical application and sensitivity analyses of a human left ventricular control system model.** M. K. Patil and D. N. Ghista (Indian Institute of Technology, Madras, India). *Bulletin of Mathematical Biology*, vol. 37, 1975, p. 521-553. 40 refs.

A76-21781 * **Automated single-slide staining device.** J. R. Wilkins and S. M. Mills (NASA, Langley Research Center, Hampton, Va.). *Applied Microbiology*, vol. 30, Sept. 1975, p. 485-488.

An automatic single-slide Gram staining device is described. A timer-actuated solenoid controls the dispensing of gentian violet, Gram iodine solution, decolorizer, and 1% aqueous safranin in proper sequence and for the time required for optimum staining. The amount of stain or reagent delivered is controlled by means of stopcocks below each solenoid. Used stains and reagents can be flushed automatically or manually. Smears Gram stained automatically are equal in quality to those prepared manually. The time to complete one Gram cycle is 4.80 min. C.K.D.

A76-21784 * **Binocular summation and peripheral visual response time.** K. Gilliland (Northwestern University, Evanston, Ill.) and R. F. Haines (NASA, Ames Research Center, Man-Machine Integration Branch, Moffett Field, Calif.). *American Journal of Optometry and Physiological Optics*, Dec. 1975. 6 p. 16 refs. Grant No. NGL-05-046-002.

Six males were administered a peripheral visual response time test to the onset of brief small stimuli imaged in 10-deg arc separation intervals across the dark adapted horizontal retinal meridian under both binocular and monocular viewing conditions. This was done in an attempt to verify the existence of peripheral binocular summation using a response time measure. The results indicated that from 50-deg arc right to 50-deg arc left of the line of sight binocular summation is a reasonable explanation for the significantly faster binocular data. The stimulus position by viewing eye interaction was also significant. A discussion of these and other analyses is presented along with a review of related literature.
(Author)

A76-21787 * **Suppression of plasma renin and plasma aldosterone during water immersion in normal man.** M. Epstein (U.S. Veterans Administration Hospital, Miami, Fla.), D. S. Pins (Miami, University, Miami, Fla.), J. Sancho (Massachusetts General Hospital, Boston, Mass.), and E. Haber (Harvard University, Boston, Mass.). *Journal of Clinical Endocrinology and Metabolism*, vol. 41, Sept. 1975, p. 618-625. 22 refs. Research supported by the U.S. Veterans Administration; Grants No. NGR-10-007-097; No. NIH-RR-261; Contract No. NAS9-11846.

A76-21788 * **The effect of 2-deoxy-D-glucose and D-glucose on the efferent discharge rate of sympathetic nerves.** A. Niijima (NASA, Ames Research Center, Biotechnology Div., Moffett Field, Calif.). *Journal of Physiology*, vol. 251, 1975, p. 231-243. 15 refs.

A76-21792 * **Factors affecting the palmitoyl-coenzyme A desaturase of Saccharomyces cerevisiae.** H. P. Klein and C. M. Volkmann (NASA, Ames Research Center, Planetary Biology Div., Moffett Field, Calif.). *Journal of Bacteriology*, vol. 124, Nov. 1975, p. 718-723. 26 refs.

The activity and stability of the palmitoyl-coenzyme A (CoA) desaturase complex of Saccharomyces cerevisiae was influenced by several factors. Cells, grown nonaerobically and then incubated with glucose, either in air or under N2, showed a marked increase in desaturase activity. Cycloheximide, added during such incubations, prevented the increase in activity, suggesting de novo synthesis. The stability of the desaturase from cells grown nonaerobically was affected by subsequent treatment of the cells; enzyme from freshly harvested cells, or from cells that were then shaken under nitrogen, readily lost activity upon washing or during density gradient analysis, whereas aerated cells, in the presence or absence of glucose, yielded stable enzyme preparations. The loss of activity in nonaerobic preparations could be reversed by adding soluble supernatant from these homogenates and could be prevented by growing the cells in the presence of palmitoleic acid and ergosterol, but not with several other lipids tested. (Author)

A76-21836 # **Effects of hypoxia on distribution of cardiac output and organ blood flow in the rabbit - Regional vascular response to hypoxia.** F. Wyler (Children's Hospital, Basel, Switzerland). *Cardiology*, vol. 60, no. 3, 1975, p. 163-172. 31 refs. Swiss National Science Foundation Grant No. 3,570,71.

The hemodynamic responses of various vascular beds in the systemic circulation to prolonged moderate hypoxia were studied in the rabbit using the radioactive microsphere method. Although cardiac output remained unchanged, there was a redistribution of blood flow in which blood was mainly diverted from the kidneys to provide greater supply to heart, brain and skeletal muscle. These regional adjustments are similar to those seen after low cardiac output due to hemorrhage or endotoxic shock. (Author)

A76-22226 # **Responses of reticular and ventral anterior thalamic neurons of the visual cortex to afferent stimuli of different modalities in cats (Reaktsii neironov retikuliarnogo i ventral'nogo perednego iader zritel'nogo bugra koshki na afferentnye razdrazheniia razlichnoi modal'nosti).** M. Ia. Voloshin and V. F. Prokopenko (Akademia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Neirofiziologiia*, vol. 7, no. 6, 1975, p. 563-571. 21 refs. In Russian.

A76-22227 # **Transmission of excitation in the feline optic system (O provedenii vozbuzhdeniia v zritel'noi sisteme koshki).** V. M. Shaban (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Neirofiziologiia*, vol. 7, no. 6, 1975, p. 589-596. 30 refs. In Russian.

The response of striate neurons of the visual cortex to stimulation of the lateral corpus geniculatum (LCG) and of the tractus opticus (TO) was investigated in unanesthetized, d-tubocurarin-immobilized cats. Stimulation of the LCG evoked a response in 53.6% of the neurons studied, of which 92% were activated orthodromically with latencies ranging from 2 to 12.5 ms. Most responses fell into one of three groups (2.0-2.5; 3.0-3.5; 4.0-4.5 ms), corresponding to three different components of the positive wave of the primary response. An additional 8% of the cells was activated antidromically. The difference in response latencies in stimulation of the TO and LCG was most frequently in the 0.5 to 1 ms range. It is postulated that optic radiation fibers are of three different types, with transmission velocities of 28.5-16.6, 11.7-8.9, and 7.4-6.0 m/s. The characteristics of afferent volleys formed in retino-geniculate paths apparently sustain no significant changes during processing in the LCG. C.K.D.

A76-22247 * **Maximum carbon isotope fractionation in photosynthesis by blue-green algae and a green alga.** J. W. Pardue, R. S. Scalan, C. Van Baalen, and P. L. Parker (Texas, University, Port Aransas, Tex.). *Geochimica et Cosmochimica Acta*, vol. 40, Mar. 1976, p. 309-312. 28 refs. Grant No. NGR-44-012-225.

A76-22329 # **The use of mathematical logic and goal-oriented languages in the formation of robot plans (L'impiego della logica matematica e dei linguaggi orientati ad obiettivi nella formazione di piani per robot).** P. Corti, G. Gini, M. Gini (Milano, Politecnico, Milan, Italy), and E. Pagello (CNR, Laboratorio di Elettronica Industriale, Padua, Italy). *Alta Frequenza*, vol. 45, Jan. 1976, p. 35-45. 23 refs. In Italian.

Formal logic and the creation of a computer-implemented goal-oriented language are applied to the design of an intelligent robot for manipulating objects. The aim of the design is to furnish the robot with an autonomous deductive capacity which would permit it to plan its actions in pursuing an object in a defined and delimited 'world'. The program for generating the robot plan or goal-oriented language would take account of the initial configurations of this 'world', of the laws valid in it and of the scope of encounter between robot and object. B.J.

A76-22356 # **Utilisation of Spacelab for life-science experiments.** G. Seibert (ESA, Directorate of Planning and Future Programmes, Neuilly-sur-Seine, Hauts-de-Seine, France). *ESA Bulletin*, Feb. 1976, p. 68-70.

Potential scientific objectives of Spacelab life-science experiments are related to an investigation of problems in the areas of biomedicine and biology, behavioral studies, and improvements concerning the technological systems required to insure man's well-being and productivity in space. The life-science experiments envisaged are considered, giving attention to studies of the vestibular function, human physiology and psychology experiments, animals experiments, investigations regarding the effects of hard radiation, and plant experiments. G.R.

A76-22372 **Perceptual illusion of rotation of three-dimensional objects.** R. N. Shepard and S. A. Judd (Stanford University, Stanford, Calif.). *(American Psychological Association, Annual Meeting, Chicago, Ill., Aug. 31, 1975.) Science*, vol. 191, Mar. 5, 1976, p. 952-954. 12 refs. NSF Grant No. BMS-75-02806.

Perspective views of the same three-dimensional object in two orientations, when presented in alternation, produced an illusion of rigid rotation. The minimum cycle duration required for the illusion increased linearly with the angular difference between the orientations and at the same slope for rotations in depth and in the picture plane. (Author)

STAR ENTRIES

N76-16729 Saskatchewan Univ., Saskatoon.
PRODUCTION AND CHARACTERIZATION OF ENZYMES STABILIZED AS HUMIC ACID ANALOGUES Ph.D. Thesis
Michael John Rowell 1974 178 p
Avail: Univ. Microfilms Order No. 76-738

Mechanisms for the incorporation of enzymes into humic constituents and their stabilization in soil were studied using model systems. Water-soluble (S-BQ) and water-insoluble (I-BQ) enzyme derivatives were produced by the reaction of p-benzoquinone and trypsin, pronase, papain, subtilisin, acid phosphatase, carboxypeptidase A and uroase. Yield of derivative, nitrogen content and the retention of activity varied depending upon the reaction pH, amount of each constituent added, type of complex and the specific enzyme involved. Lyophilization reduced the activity of most enzyme derivatives. Generally, enzyme complexes were considerably more stable at high temperatures than the free enzyme. Enzymic characteristics such as pH activity and stability, temperature optimal, and kinetic constants were often markedly different from those of the free enzyme. Steric effects were also evident. Dissert. Abstr.

N76-16730# Joint Publications Research Service, Arlington, Va.
SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 9, NO. 5, 1975
17 Dec. 1975 159 p refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 9, no. 5, Sep.-Oct. 1975 (JPRS-66404) Avail: NTIS HC $6.75

The report contains articles concerning the selection and training of cosmonauts; evaluation and analysis of accumulated data to facilitate the on-going transition from orbital to interplanetary flights; research aimed at guaranteeing safety on long flights and reliability of the human component of the man-spaceship system; space psychology and physiology; and environmental problems and control (spacecraft habitability, effects of radiation and weightlessness, etc.)

N76-16731 Joint Publications Research Service, Arlington, Va.
OXYGEN EXCHANGE IN THE BODY ACCOMPANYING REPLACEMENT OF ATMOSPHERIC NITROGEN BY HELIUM
G. V. Troshikhin, L. A. Isaakyan, and G. G. Bekirova *In its* Space Biol. and Aerospace Med., Vol. 9, No. 5, 1975 (JPRS-66404) 17 Dec. 1975 p 13-20 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 9, no. 5, Sep.-Oct. 1975 p 10-14

Total gas exchange, body temperature, content of free oxygen in the quadriceps muscle and its changes upon oxygen inhalation of a known dosage (oxygen test) were measured using Wistar rats during their one-hour exposure to a helium-oxygen atmosphere (21%) at 25 C. In this atmosphere the animals exhibited a 1.8 deg dropoff of body temperature, a 20.5% increase in gas exchange and a 26% decrease in oxygen in muscle tissue in comparison with the corresponding parameters in the air. After the experiment, during the first 10-minute exposure to a normal atmosphere the oxygen tests were 10-15% lower than before the experiment. These findings give evidence of an increase in oxygen exchange in the muscles of animals exposed to a helium-oxygen atmosphere at a temperature below a comfortable level. Author

N76-16732 Joint Publications Research Service, Arlington, Va.
RESTRUCTURING OF THE HUMAN TEMPERATURE RHYTHM AFTER INVERSION OF THE RHYTHM OF LIFE IN ISOLATION
S. I. Stepanova and S. P. Kukishev *In its* Space Biol. and Aerospace Med., Vol. 9, No. 5, 1975 (JPRS-66404) 17 Dec. 1975 p 57-69 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 9, no. 5, Sep.-Oct. 1975 p 35-44

The diurnal dynamics of body temperature of four male test subjects was studied before and after inversion of their sleep-wakefulness cycle in an isolation chamber. One subject exhibited restructuring of the temperature rhythm in accordance with the new cycle which was completed by the 11th day of confined life. The other test subjects exhibited only a partial adaptation of body temperature to the new sleep-wakefulness cycle during the 34-day experiment. Author

N76-16733 Joint Publications Research Service, Arlington, Va.
CORRELATION BETWEEN THE AUTOMONIC COMPONENTS OF THE ORIENTATION REACTION AND THE NATURE OF THE INFORMATION RECEIVED BY AN AIRMAN
R. I. Brusnichkina *In its* Space Biol. and Aerospace Med., Vol. 9, No. 5, 1975 (JPRS-66404) 17 Dec. 1975 p 78-85 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 9, no. 5, Sep.-Oct. 1975 p 49-54

The influence of the pattern of the information (certainty and significance) which reaches a pilot on the physiological parameters of his orientation reaction (skin-galvanic reflex, heart rate, electromyograph) was examined. Two experimental series, on a simulation stand and in real flight, were carried out; collected data show that the pattern of the orientation reaction is related to the information certainty and significance. The responses of physiological parameters to significant elements of the situation are shown to be phasic. Author

N76-16734 Joint Publications Research Service, Arlington, Va.
COLOR PERCEPTION AFTER INTENSIVE PHOTOSTIMULATION
V. I. Shostak *In its* Space Biol. and Aerospace Med., Vol. 9, No. 5, 1975 (JPRS-66404) 17 Dec. 1975 p 92-97 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 9, no. 5, Sep.-Oct. 1975 p 57-60

After a monocular effect of short-term intensive light stimulation (80 micro sec in duration with an illuminance of 1,600 candle/sec) which followed complete adaptation to the darkness, test subjects exhibited color perception disorders. These included a decrease in the acuity of color discrimination measured with the AN-59 anomaloscope and significant distortion of the subjective evaluation of different color stimuli. The spectrum of an experimental intensive light effect was varied; it was thus shown that color perception disorders were associated with a nonuniform decrease in the sensitivity of color perception systems. The pattern and duration of these disturbances were dependent on the spectral composition and intensity of the light stimulus. Author

N76-16735 Joint Publications Research Service, Arlington, Va.
GAS EXCHANGE DURING HYPERCAPNIA UNDER CONDITIONS OF DIFFERENT OXYGEN CONTENT
V. P. Zagryadskiy and Z. K. Sulimo-Samuyllo *In its* Space Biol. and Aerospace Med., Vol. 9, No. 5, 1975 (JPRS-66404) 17 Dec. 1975 p 98-105 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 9, no. 5, Sep.-Oct. 1975 p 61-65

During the slow development of a hypercapnic state aggravated by a lowered oxygen content in the breathing air the oxygen supply of the human body decreases noticeably. This occurs at rest as well. An increase in the oxygen content in the breathing air to 20-22% alleviates the adverse hypercapnic effect and therefore improves gas exchange parameters. Author

N76-16736 Joint Publications Research Service, Arlington, Va.
SENSORY AND MOTOR COMPONENTS OF EYE FIXATION

MOVEMENT DURING EXPOSURE TO ANGULAR ACCELERATIONS

V. I. Babiyak. *In its* Space Biol. and Aerospace Med., Vol. 9, No. 5, 1975 (JPRS-66404) 17 Dec. 1975 p 106-113 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 9, no. 5, Sep.-Oct. 1975 p 66-70

The effect of angular accelerations on the eye fixation function and concomitant sensory reactions was investigated under special conditions. An illusion of target distortion toward the rapid component of vestibular nystagmus developed in these situations. Changes in eye fixation movements and sensation of target were coordinated and depended on the direction of the vestibular nystagmus. The findings indicate that during an exposure to angular accelerations the stability of target perceptions is disturbed, and objectively recorded errors of its fixation by the optic apparatus are made. Author

N76-16737 Joint Publications Research Service, Arlington, Va.

CHANGES IN THE INDUCED POTENTIAL IN MAN DURING ALTITUDE DECOMPRESSION

A. A. Antonov. *In its* Space Biol. and Aerospace Med., Vol. 9, No. 5, 1975 (JPRS-66404) 17 Dec. 1975 p 114-121 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 9, no. 5, Sep.-Oct. 1975 p 71-75

In order to evaluate the functional state of the central nervous system during altitude decompression, the method of recording the induced potential to a light stimulus was used. Changes in the latent periods and energies of induced potential waves were noted during different decompression regimes. It therefore was concluded that the functional state of the central nervous system changes before bends; during bends it changes more significantly. The response to a short-term effect of painless decompression and to painful symptoms of the disease is different. Author

N76-16738 Joint Publications Research Service, Arlington, Va.

INCREASING THE HEAT TOLERANCE OF THE HUMAN BODY BY MUSCLE CONDITIONING

F. T. Agarkov and A. S. Pavlov. *In its* Space Biol. and Aerospace Med., Vol. 9, No. 5, 1975 (JPRS-66404) 17 Dec. 1975 p 122-129 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 9, no. 5, Sep.-Oct. 1975 p 75-80

Experiments carried out with 129 athletes (gymnasts, weightlifters and boxers) and 153 nonathletes demonstrated that sports training considerably increases the general and specific physical performance and elevates by a factor of 2-2.5 human tolerance to thermal effects. The relationship between the signs of physical fitness of athletes and the levels of their tolerance to heat was established. The procedure for evaluating the thermal tolerance of man was developed, together with a scale for its evaluation. Author

N76-16739 Joint Publications Research Service, Arlington, Va.

CHANGE IN HEMOGLOBIN MASS DURING PROLONGED HYPOKINESIA

R. K. Kiselev, R. S. Balakhovskiy, and O. A. Virovets. *In its* Space Biol. and Aerospace Med., Vol. 9, No. 5, 1975 (JPRS-66404) 17 Dec. 1975 p 130-136 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 9, no. 5, Sep.-Oct. 1975 p 80-84

Total hemoglobin mass was measured by the carbon dioxide method in 33 test subjects, 21 of whom were exposed to 30-day bedrest and six of whom were exposed to 100-day bedrest. The hypokinetic test subjects exhibited a decrease in hemoglobin mass by 11-24%. During readaptation the test subjects who had a noticeable reduction of homoglobin exhibited an increase in the reticulocyte count by a factor of 2.7. It is postulated that the decrease in gravity during bedrest and antiorthostatic hypokinesia results in a reduced rate of hemoglobin synthesis in the bone marrow. Author

N76-16740*# Scientific Translation Service, Santa Barbara, Calif.

GEOTROPIC REACTION OF PLANTS

A. I. Merkis. Washington NASA Jan. 1976 316 p refs Transl. into ENGLISH of the book "Geotropicheskaya Reaktsiya Rasteniy" Vilnyus, Mintis Press, 1973 p 1-261
(Contract NASw-2791)
(NASA-TT-F-16826) Avail: NTIS HC $9.75 CSCL 06C

Data on the physiology (auxins, amino acids, and other metabolites) of the geotropic reaction of plants is presented. Systems of perception and fixation of the geotropic stimulus are examined, as in the response phase of geotropic bending. The text is a manual for a wide range of physiologists and specialists concerned with problems of gravitational effects in plants. Crop lodging in wheat was specifically studied. Author

N76-16741*# Scientific Translation Service, Santa Barbara, Calif.

SPACE-EARTH FORECASTS

I. P. Druzhinin. Washington NASA Dec. 1975 302 p refs Transl. into ENGLISH of the book "Kosmos-Zemlya. Prognozy" Moscow, Mysl Press, 1974 p 1-288
(Contract NASw-2791)
(NASA-TT-F-16375) Avail: NTIS HC $9.75 CSCL 08D

Concepts of the effect of space phenomena on terrestrial processes (in the U.S.S.R.) are presented. Ways and methods of predicting the course of natural phenomena on the basis of cosmic data are examined. Topics discussed include: (1) economic benefits to the Soviet Union; (2) weather forecasting; (3) crop forecasting; (4) solar activity effects on populations of plants and animals; and (5) solar activity effects on human disease cycles. Author

N76-16742*# Joint Publications Research Service, Arlington, Va.

MICROORGANISMS IN THE STRATOSPHERE

A. A. Imshenetskiy, S. V. Lysenko, and G. A. Kazakov. Washington NASA Feb. 1976 7 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (USSR), v. 224, no. 1, 1975 p 223-225
(NASA Order W-13183)
(NASA-TT-F-16872) Avail: NTIS HC $3.50 CSCL 06C

Microbiological analyses of the stratosphere by meteorological rockets carrying sampling devices are reported. Among colonies of microorganisms, the microscopic fungi Circinelle muscae, Penicillium, Aspergillus niger, and Mycelia sterilia were found. In addition, a culture of microbacteria and micrococcus was detected that formed yellow-orange and white colonies on dense nutrient media. G.G.

N76-16744# Royal Aircraft Establishment, Farnborough (England).

VERTEBRAL FRACTURES IN PILOTS INVOLVED IN HELICOPTER ACCIDENTS

P. Italiano. Sep. 1975 21 p refs Transl. into ENGLISH from Riv. Med. Aeronaut. Spaz. (Italy), v. 29, no. 4, 1966 p 577-602
(RAE-Lib-Trans-1854; BR49820) Avail: NTIS HC $3.50

After a survey of the most frequent causes of helicopter accidents, vertebral fractures which occurred during some of the accidents were considered. Vertebral fractures arising from helicopter accidents are located in the thoraco-lumbar junction. They show pecular radiological characteristics, depending upon their pathogenesis. In the cases considered, this always occurred during a drop of several meters to the ground and was facilitated by the slightly forward, titled position assumed by the pilot. The fatigue state of the pilot during flight was also considered, and it was determined that vibration is of particular importance. The following points are proposed to improve flight safety: (1) helicopters designed to reduce vibration, (2) seats which fit close to the pilot, take into account his flying position, and contain shock absorbers, and (3) psycho-physical tests to help determine an acceptable number of flying hours per day and a weekly rest period. Author

N76-16745*# Texas Inst. for Rehabilitation and Research, Houston. Biostereometrics Lab.

STEREOMETRIC BODY VOLUME MEASUREMENT Final Report

R. E. Herron. 1975 61 p refs
(Contract NAS9-11604)
(NASA-CR-147399) Avail: NTIS HC $4.50 CSCL 06P

The following studies are reported: (1) effects of extended space flight on body form of Skylab astronauts using biostereometrics; (2) comparison of body volume determinations using hydrostatic weighing and biostereometrics; and (3) training of technicians in biostereometric principles and procedures. Author

N76-16746*# Naval Aerospace Medical Research Lab., Pensacola, Fla.
NUCLEAR EMULSION MEASUREMENTS OF THE ASTRONAUTS' RADIATION EXPOSURES ON SKYLAB MISSIONS 2, 3, AND 4
Hermann J. Schaefer and Jeremiah J. Sullivan. 10 Dec. 1975 17 p. refs
(NASA Order T-43310-G)
(NASA-CR-147436; NAMRL-1220) Avail: NTIS HC $3.50 CSCL 06R

On the Skylab missions, Ilford G.5 and K.2 emulsions were flown as part of passive dosimeter packs carried by the astronauts on their wrists. Due to the long mission times, latent image fading and track crowing imposed limitations on a quantitative track and grain count analysis. For Skylab 2, the complete proton energy spectrum was determined within reasonable error limits. A combined mission dose equivalent of 2,490 millirems from protons, tissue stars and neutrons was measured on Skylab 2. A stationary emulsion stack, kept in a film vault drawer on the same mission, displayed a highly structured directional distribution of the fluence of low-energy protons (enders) reflecting the local shield distribution. On the 59 and 84-day mission 3 and 4, G.5 emulsions had to be cut on the microtom to 5-7 microns for microscopic examination. Even so, the short track segments in such thin layers precluded a statistically reliable grain count analysis. However, the K.2 emulsions still allowed accurate proton ender counts without special provisions. Author

N76-16747*# Kanner (Leo) Associates, Redwood City, Calif.
SOME ASPECTS OF THE PROBLEM OF PREDICTING MAN'S HEALTH DURING A SPACE FLIGHT
Yu. M. Svirezhev. Washington NASA 12 Jan. 1976 86 p refs Transl. into ENGLISH of Conf. paper from Acad. of Sci. of the USSR, Moscow. Presneted at the Sixth Conf. of the Sov.-Am. Working Group on Space Biol. and Med., 1975 p 1-78
(Contract NASw-2790)
(NASA-TT-F-16838) Avail: NTIS HC $5.00 CSCL 06S

The overall SISMEC prediction system and the goal of combining in it the advantages of expert prediction (knowledge and intuition of medical specialists) and mathematical prediction (rapid processing of much data and real time prediction) are described. Mathematical derivation and analysis of both purely mathematical and expert prediction models follows. Testing of numerous models against Soyuz, Salyut and Skylab data on cosmonaut physiological functions is presented in detail. Tolerance of LBNP is found to be predicted best from soft, partial LBNP tests, and further tests of some models are found necessary. Guidelines for joint Soviet-American development of the system are given. Author

N76-16748*# California Univ., Berkeley. White Mountain Research Station.
IN VIVO MEASUREMENT OF HUMAN BODY COMPOSITION Semiannual Status Report, 1 Jan. - 30 Jun. 1975
Nello Pace, Benjamin W. Grunbaum, Arthur M. Kodama, and David C. Price. 30 Jun. 1975 67 p
(Grant NGR-05-003-470)
(NASA-CR-146223; SASR-6) Avail: NTIS HC $4.50 CSCL 06B

Physiological changes in human beings were studied during a 21 day bed rest regime. Results of blood analyses indicated clearly that major metabolic adjustments occurred during prolonged bed rest. However, urinary metabolic analyses showed variances attributed to specimen collection inaccuracies and the small number of test subjects. G.G.

N76-16749*# Old Dominion Univ. Research Foundation, Norfolk, Va.
DEVELOPMENT OF A DOSIMETER FOR DISTRIBUTED BODY ORGANS Progress Report, 31 May - 30 Nov. 1975
Govind S. Khandelwal (Old Dominion Univ.) 26 Jan. 1976 35 p refs
(Grant NsG-1055)
(NASA-CR-146225) Avail: NTIS HC $4.00 CSCL 06R

Calculational methods for estimation of dose from external proton exposure of aribtrary convex bodies is briefly reviewed and all of the necessary information for the estimation of dose in soft tissue is presented. Special emphasis is on retaining the effects of nuclear reaction especially in relation to the dose equivalent. Author

N76-16750*# Joint Publications Research Service, Arlington, Va.
PSYCHOLOGICAL PROBLEMS OF INTERPLANETARY FLIGHT
A. A. Leonov and V. I. Lebedev. Washington NASA Oct. 1975 238 p refs Transl. into ENGLISH of the book "Psikhologicheskiye Problemy Mezhplanetnogo Poleta" Moscow, Izd. Nauka, 1975 p 4-248
(NASA Order W-13183-197)
(NASA-TT-F-16536) Avail: NTIS HC $8.00 CSCL 16S

Psychological compatibility among crew members of an interplanetary ship is examined under the conditions of group isolation, the extended effect of weightlessness on human mental processes, the effect of sensory and information starvation on the appearance of unusual mental states, emotional stress, and the rhythm of working and rest. Author

N76-16751*# Organon Diagnostics, El Monte, Calif.
MEMS REAGENT AND SAMPLE HANDLING PROCEDURE: FEASIBILITY OF VIRAL ANTIBODY DETECTION BY PASSIVE IMMUNE AGGLUTINATION Final Report, Jan. - Sep. 1975
G. D. Bailey and H. J. Tenoso. 1 Dec. 1975 81 p refs
(Contract NAS9-13672)
(NASA-CR-147398; Rept-115-F) Avail: NTIS HC $5.00 CSCL 06E

An attempt was made to develop a test requiring no preadsorption steps for the assessment of antibodies to rubella and mumps viruses using the passive immune agglutination (PIA) method. Both rubella and mumps antigens and antibodies were prepared. Direct PIA tests, using rubella antigen-coated beads, and indirect PIA tests, using rubella antibody-coated beads, were investigated. Attempts, using either method, were unsuccessful. Serum interference along with nonspecific agglutination of beads by the rubella antigen resulted in no specific response under the test conditions investigated. A new, highly sensitive approach, the enzyme immunoassay (EIA) test system, is recommended to overcome the nonspecificity. This system is a logical outgrowth of some of the solid phase work done on MEMS and represents the next generation tests system that can be directly applied to early disease detection and monitoring. Author

N76-16752# Interuniversitair Reactor Instituut, Delft (Netherlands).
MEASUREMENTS OF THE DOSAGE RESULTING FROM BACKGROUND RADIATION IN BUILDINGS WITH A Ge(Li) DETECTOR [METINGEN MET EEN Ge(Li)-DETECTOR VAN DE DOSIS TENGEVOLGE VAN ACHTERGRONDSTRALING IN GEBOUWEN]
J. A. Akkermans and C. Roodbergen [1974] 30 p refs In DUTCH
(IRI-190-74-03) Avail: NTIS HC $4.00

A method was developed by which the dosage rate of all gamma radiation of a nuclide can be determined from the gamma spectrum, measured with a Ge(Li) semiconductor detector or an NaJ(Tl) scintillation counter. The total dosage rate of a nuclide, including possible daughter products, was calculated from the surface of one photopeak in the gamma spectrum of the nuclide. This is based on calculated values for the percentage contribution of one gamma transition to the total dosage rate as a result of all gamma radiation emitted by the nuclide. A number of measurements were carried out with a Ge(Li) detector at various locations within a building. Individual contributions to the dosage

rate of 40K, 226 Ra, and 232 Th were calculated. The dosage rate in rooms with concrete walls is about three times as high as in rooms with wooden walls. Author (ESA)

N76-16753# Interuniversitair Reactor Instituut, Delft (Netherlands)
CONDENSATION OF WATER ON DRY SALT CRYSTALS. DESCRIPTION OF THE COMPUTER PROGRAM
G. A. Ferron. 16 Sep. 1975. 21 p. refs
(IRI-190-75-04) Avail: NTIS HC $3.50

A computer program for simulating the condensation of water vapor on dry salt crystals after entering the human respiratory system is described. The calculations are based on the quasi-stationary transport equations for mass and heat transfer. Both equations are corrected for the mean free path of the air molecules with the method described by Fuchs. Furthermore, the vapor pressure at the particle surface is corrected for salt dissolved in the particle liquid and the curvature of the particle surface. The calculations were carried out using an iteration process: at each step the mass of the particle increases with a part f of the mass of the particle; then the new quantities of the particles are calculated. Author (ESA)

N76-16754*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
THE 1975 RIDE QUALITY SYMPOSIUM
Washington, Nov. 1975. 648 p. refs. Symp. held at Williamsburg, Va., 11-12 Aug. 1975; sponsored by NASA and DOT
(NASA-TM-X-3295; DOT-TSC-OST-75-40; L-10448) Avail: NTIS HC $16.25 CSCL 05H

A compilation is presented of papers reported at the 1975 Ride Quality Symposium held in Williamsburg, Virginia, August 11-12, 1975. The symposium, jointly sponsored by NASA and the United States Department of Transportation, was held to provide a forum for determining the current state of the art relative to the technology base of ride quality information applicable to current and proposed transportation systems. Emphasis focused on passenger reactions to ride environment and on implications of these reactions to the design and operation of air, land, and water transportation systems acceptable to the traveling public. Papers are grouped in the following five categories: needs and uses for ride quality technology; vehicle environments and dynamics; investigative approaches and testing procedures; experimental ride quality studies; and ride quality modeling and criteria.

N76-16755* Boeing Co., Wichita, Kans.
REVIEW OF RIDE QUALITY TECHNOLOGY NEEDS OF INDUSTRY AND USER GROUPS
J. R. McKenzie and Stanley H. Brumaghim. *In* NASA. Langley Res. Center. The 1975 Ride Quality Symp. Nov. 1975. p. 5-30. refs
(Contract NAS1-13908)
CSCL 05H

A broad survey of ride quality technology, state-of-the-art and a review of user evaluation of this technology were conducted. During the study, 17 users of ride quality technology in 10 organizations representing land, marine and air passenger transportation modes were interviewed. Interim results and conclusions of this effort are reported. Author

N76-16756* Mitre Corp., Bedford, Mass.
RIDE QUALITY CRITERIA AND THE DESIGN PROCESS
R. J. Ravera. *In* NASA. Langley Res. Center. The 1975 Ride Quality Symp. Nov. 1975. p. 31-43. refs

CSCL 05H

Conceptual designs for advanced ground transportation systems often hinge on obtaining acceptable vehicle ride quality while attempting to keep the total guideway cost (initial and subsequent maintenance) as low as possible. Two ride quality standards used extensively in work sponsored by the U.S. Department of Transportation (DOT) are the DOT-Urban Tracked Air Cushion Vehicle (UTACV) standard and the International Standards Organization (ISO) reduced ride comfort criteria. These standards are reviewed and some of the deficiencies, which become apparent when trying to apply them in practice, are noted. Through the use of a digital simulation, the impact of each of these standards on an example design process is examined. It is shown that meeting the ISO specification for the particular vehicle/guideway case investigated is easier than meeting the UTACV standard. Author

N76-16757* Virginia Univ., Charlottesville.
APPLICATION OF RIDE QUALITY TECHNOLOGY TO PREDICT RIDE SATISFACTION FOR COMMUTER-TYPE AIRCRAFT
Ira D. Jacobson, A. R. Kuhlthau, and L. G. Richards. *In* NASA. Langley Res. Center. The 1975 Ride Quality Symp. Nov. 1975. p. 45-64. refs
CSCL 05H

A method was developed to predict passenger satisfaction with the ride environment of a transportation vehicle. This method, a general approach, was applied to a commuter-type aircraft for illustrative purposes. The effect of terrain, altitude and seat location were examined. The method predicts the variation in passengers satisfied for any set of flight conditions. In addition several noncommuter aircraft were analyzed for comparison and other uses of the model described. The method has advantages for design, evaluation, and operating decisions. Author

N76-16758* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
REVIEW OF MEASURED VIBRATION AND NOISE ENVIRONMENTS EXPERIENCED BY PASSENGERS IN AIRCRAFT AND IN GROUND TRANSPORTATION SYSTEMS
David G. Stephens. *In its* The 1975 Ride Quality Symp. Nov. 1975. p. 65-85. refs
CSCL 05H

Measured vibration and interior noise data are presented for a number of air and surface vehicles. Consideration is given to the importance of direction effects; of vehicle operations such as take-off, cruise, and landing; and of measurement location on the level and frequency of the measurements. Various physical measurement units or descriptors are used to quantify and compare the data. Results suggest the range of vibration and noise associated with a particular mode of transportation and illustrate the comparative levels in terms of each of the descriptors. Collectively, the results form a data base which may be useful in assessing the ride of existing or future systems relative to vehicles in current operation. Author

N76-16759* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
NONMOTION FACTORS WHICH CAN AFFECT RIDE QUALITY
D. William Conner. *In its* The 1975 Ride Quality Symp. Nov. 1975. p. 87-96. refs
CSCL 05H

Data pertaining to nonmotion factors affecting ride quality of transport aircraft were obtained as part of NASA in-house and sponsored research studies carried out onboard commuter-airline and research aircraft. From these data, quantitative effects on passenger discomfort of seat width, seat legroom, change in cabin pressure, and cabin noise are presented. Visual cue effects are also discussed. Author

N76-16760* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
VEHICLE FOR CIVIL HELICOPTER RIDE QUALITY RESEARCH
William J. Snyder and Ronald G. Schlegel (Sikorsky Aircraft). *In its* The 1975 Ride Quality Symp. Nov. 1975. p. 97-116. refs

CSCL 05H

A research aircraft for investigating the factors involved in civil helicopter operations was developed for NASA Langley Research Center. The aircraft is a reconfigured 17000 kg (36000 lb) military transport helicopter. The basic aircraft was reconfigured with advanced acoustic treatment, air-conditioning,

and a 16-seat airline cabin. During the spring of 1975, the aircraft was flight tested to measure interior environment characteristics - noise and vibration - and was flown on 60 subjective flight missions with over 600 different subjects. Data flights established noise levels somewhat higher than expected, with a pure tone at 1400 Hz and vertical vibration levels between 0.07g and 0.17g. The noise and vibration levels were documented during subjective flight evaluations as being the primary source of discomfort. The aircraft will be utilized to document in detail the impact of various noise and vibration levels on passenger comfort during typical short-haul missions.
Author

N76-16761* Boeing Vertol Co., Philadelphia, Pa.
COMPUTER ANALYSIS OF RAILCAR VIBRATIONS
Robert R. Vlaminck. *In* NASA. Langley Res. Center The 1975 Ride Quality Symp. Nov. 1975 p 117-140

CSCL 05H

Computer models and techniques for calculating railcar vibrations are discussed along with criteria for vehicle ride optimization. The effect on vibration of car body structural dynamics, suspension system parameters, vehicle geometry, and wheel and rail excitation are presented. Ride quality vibration data collected on the state-of-the-art car and standard light rail vehicle is compared to computer predictions. The results show that computer analysis of the vehicle can be performed for relatively low cost in short periods of time. The analysis permits optimization of the design as it progresses and minimizes the possibility of excessive vibration on production vehicles. Author

N76-16762* Federal Railroad Administration, Washington, D.C.
INTERCITY RAIL-PASSENGER CAR RIDE QUALITY TEST PROGRAM
Richard L. Scharr and Raymond P. Owings (ENSCO, Inc.) *In* NASA. Langley Res. Center The 1975 Ride Quality Symp. Nov. 1975 p 141-158
CSCL 05H

The Federal Railroad Administration's research and development program relating to intercity rail-passenger ride quality focuses on developing ride quality design criteria and specifications. The FRA ride quality test program and some of the techniques being used to analyze and evaluate the design criteria of the program are discussed.
Author

N76-16763* Princeton Univ., N.J.
THE PITCH-HEAVE DYNAMICS OF TRANSPORTATION VEHICLES
L. M. Sweet and H. H. Richardson (MIT, Cambridge) *In* NASA. Langley Res. Center The 1975 Ride Quality Symp. Nov. 1975 p 159-179 refs
CSCL 05H

The analysis and design of suspensions for vehicles of finite length using pitch-heave models is presented. Dynamic models for the finite length vehicle include the spatial distribution of the guideway input disturbance over the vehicle length, as well as both pitch and heave degrees-of-freedom. Analytical results relate the vehicle front and rear accelerations to the pitch and heave natural frequencies, which are functions of vehicle suspension geometry and mass distribution. The effects of vehicle asymmetry and suspension contact area are evaluated. Design guidelines are presented for the modification of vehicle and suspension parameters to meet alternative ride quality criteria.
Author

N76-16764* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
AN APPROACH TO HIGH SPEED SHIP RIDE QUALITY SIMULATION
W. L. Malone (Naval Sea Systems Command) and J. M. Vickery (Royal Navy) *In its* The 1975 Ride Quality Symp. Nov. 1975 p 181-215 refs
CSCL 05H

The high speeds attained by certain advanced surface ships result in a spectrum of motion which is higher in frequency than that of conventional ships. This fact along with the inclusion of advanced ride control features in the design of these ships resulted in an increased awareness of the need for ride criteria. Such criteria can be developed using data from actual ship operations in varied sea states or from clinical laboratory experiments. A third approach is to simulate ship conditions using measured or calculated ship motion data. Recent simulations have used data derived from a math model of Surface Effect Ship (SES) motion. The model in turn is based on equations of motion which have been refined with data from scale models and SES of up to 101 600-kg (100-ton) displacement. Employment of broad band motion emphasizes the use of the simulators as a design tool to evaluate a given ship configuration in several operational situations and also serves to provide data as to the overall effect of a given motion on crew performance and physiological status.
Author

N76-16765* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EVALUATION OF RIDE QUALITY MEASUREMENT PROCEDURES BY SUBJECTIVE EXPERIMENTS USING SIMULATORS
Louis T. Klauder, Jr. (Klauder (Louis T.) and Assoc.) and Sherman A. Clevenson *In its* The 1975 Ride Quality Symp. Nov. 1975 p 217-265 refs
CSCL 05H

Since ride quality is, by definition, a matter of passenger response, there is need for a qualification procedure (QP) for establishing the degree to which any particular ride quality measurement procedure (RQMP) does correlate with passenger responses. Once established, such a QP will provide very useful guidance for optimal adjustment of the various parameters which any given RQMP contains. A QP is proposed based on use of a ride motion simulator and on test subject responses to recordings of actual vehicle motions. Test subject responses are used to determine simulator gain settings for the individual recordings such as to make all of the simulated rides equally uncomfortable to the test subjects. Simulator platform accelerations vs. time are recorded with each ride at its equal discomfort gain setting. The equal discomfort platform acceleration recordings are then digitzed.
Author

N76-16766* University Coll. of Swansea (Wales). Dept. of Mechanical Engineering.
TECHNIQUES FOR OBTAINING SUBJECTIVE RESPONSE TO VERTICAL VIBRATION
Michael J. Clarke and David J. Oborne *In* NASA. Langley Res. Center The 1975 Ride Quality Symp. Nov. 1975 p 267-286 refs
CSCL 05H

Laboratory experiments were performed to validate the techniques used for obtaining ratings in the field surveys carried out by the University College of Swansea. In addition, attempts were made to evaluate the basic form of the human response to vibration. Some of the results obtained by different methods are described.
Author

N76-16767* Hampton Inst., Va.
DEMOGRAPHIC AND PSYCHOLOGICAL VARIABLES AFFECTING TEST SUBJECT EVALUATIONS OF RIDE QUALITY
Nancy C. Duncan and Harold W. Conley *In* NASA. Langley Res. Center The 1975 Ride Quality Symp. Nov. 1975 p 287-321 refs
CSCL 05H

Ride-quality experiments similar in objectives, design, and procedure were conducted, one using the U.S. Air Force Total In-Flight Simulator and the other using the Langley Passenger Ride Quality Apparatus to provide the motion environments. Large samples (80 or more per experiment) of test subjects were recruited from the Tidewater Virginia area and asked to rate the comfort (on a 7-point scale) of random aircraft motion typical of that encountered during STOL flights. Test subject characteristics of age, sex, and previous flying history (number of previous airplane flights) were studied in a two by three by three factorial design. Correlations were computed between one dependent measure, the subject's mean comfort rating, and various

demographic characteristics, attitudinal variables, and the scores on Spielberger's State-Trait Anxiety Inventory. An effect of sex was found in one of the studies. Males made higher (more uncomfortable) ratings of the ride than females. Age and number of previous flights were not significantly related to comfort ratings. No significant interactions between the variables of age, sex, or previous number of flights were observed. Author

N76-16768* Birmingham Univ. (England). Dept. of Mechanical Engineering.
HUMAN COMFORT IN RELATION TO SINUSOIDAL VIBRATION
B. Jones and B. K. N. Rao. *In* NASA. Langley Res. Center The 1975 Ride Quality Symp. Nov. 1975 p 323-351 refs

CSCL 05H

An investigation was made to assess the overall subjective comfort levels to sinusoidal excitations over the range 1 to 19 Hz using a two axis electrohydrauli vibration simulator. Exposure durations of 16 minutes, 25 minutes, 1 hour, and 2.5 hours have been considered. Subjects were not exposed over such durations, but were instructed to estimate the overall comfort levels preferred had they been constantly subjected to vibration over such durations. Author

N76-16769* Old Dominion Univ., Norfolk, Va.
EFFECT OF VIBRATION IN COMBINED AXES ON SUBJECTIVE EVALUATION OF RIDE QUALITY
Raymond H. Kirby, Glynn D. Coates (NASA, Langley Res. Center, Langley Station, Va.), Peter J. Mikulka, Thomas K. Dempsey, and Jack D. Leatherwood. *In* NASA. Langley Res. Center The 1975 Ride Quality Symp. Nov. 1975 p 355-371 refs

CSCL 05H

The effects of simultaneous sinusoidal vibration in the vertical and lateral axes on ratings of discomfort were investigated. The first experiment concentrated on the effects of variation of frequency in the two axes, and the second study concentrated on the effects of amplitude variation in the two axes. Author

N76-16770* National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
PASSENGER RIDE QUALITY RESPONSE TO AN AIRBORNE SIMULATOR ENVIRONMENT
T. D. Wolf, T. W. Rezek, and S. W. Gee. *In its* The 1975 Ride Quality Symp. Nov. 1975 p 373-385 refs

CSCL 05H

The present study was done aboard a special aircraft able to effect translations through the center of gravity with a minimum of pitch and roll. The aircraft was driven through controlled motions by an on-board analog computer. The input signal was selectively filtered Gaussian noise whose power spectra approximated that of natural turbulence. This input, combined with the maneuvering capabilities of this aircraft, resulted in an extremely realistic simulation of turbulent flight. The test flights also included varying bank angles during turns. Subjects were chosen from among NASA Flight Research Center personnel. They were all volunteers, were given physical examinations, and were queried about their attitudes toward flying before final selection. In profile, they were representative of the general flying public. Data from this study include (1) a basis for comparison with previous commercial flights, that is, motion dominated by vertical acceleration, (2) extension to motion dominated by lateral acceleration, and (3) evaluation of various bank angles. Author

N76-16771* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
RIDE QUALITY OF TERMINAL-AREA FLIGHT MANEUVERS
W. Elliott Schoonover, Jr. *In its* The 1975 Ride Quality Symp. Nov. 1975 p 387-408 refs

CSCL 05H

Complex terminal-area flight maneuvers being considered for airline operations may not be acceptable to passengers. To provide technology in this area, a series of flight experiments was conducted by NASA using the U. S. Air Force Total In-Flight Simulator (TIFS) aircraft to obtain subjective responses of a significant number of passenger test subjects to closely controlled and repeatable flight maneuvers. Regression analysis of the data produced a mathematical model which closely predicts mean passenger ride-comfort rating as a function of the rms six-degree-of-freedom aircraft motions during the maneuver. This ride-comfort model was exercised to examine various synthesized flight maneuvers. Author

N76-16772* Virginia Univ., Charlottesville.
PASSENGER RIDE QUALITY DETERMINED FROM COMMERCIAL AIRLINE FLIGHTS
L. G. Richards, A. R. Kuhlthau, and I. D. Jacobson. *In* NASA. Langley Res. Center The 1975 Ride Quality Symp. Nov. 1975 p 409-436 refs
CSCL 05H

The University of Virginia ride-quality research program is reviewed. Data from two flight programs, involving seven types of aircraft, are considered in detail. An apparatus for measuring physical variations in the flight environment and recording the subjective reactions of test subjects is described. Models are presented for predicting the comfort response of test subjects from the physical data, and predicting the overall comfort reaction of test subjects from their moment by moment responses. The correspondence of mean passenger comfort judgments and test subject response is shown. Finally, the models of comfort response based on data from the 5-point and 7-point comfort scales are shown to correspond. Author

N76-16773* University Coll. of Swansea (Wales).
REACTION OF PASSENGERS TO PUBLIC SERVICE VEHICLE RIDE
Michael J. Clarke and David J. Oborne. *In* NASA. Langley Res. Center The 1975 Ride Quality Symp. Nov. 1975 p 437-470 refs
CSCL 05H

A series of questionnaire studies is described, which was carried out on passengers in public service vehicles in the United Kingdom particularly cross-channel hovercraft, helicopter and train. The effectiveness of the different rating techniques employed is examined and it is demonstrated that useful and reliable information can be obtained on the effects of such physical parameters as vibration, vehicle motion and noise using rating methods which involve no external standards. Some results obtained from analysis of the survey returns are presented. Author

N76-16774* Southampton Univ. (England). Institute of Sound and Vibration Research.
A REVIEW OF RIDE COMFORT STUDIES IN THE UNITED KINGDOM
Michael J. Griffin. *In* NASA. Langley Res. Center The 1975 Ride Quality Symp. Nov. 1975 p 471-499 refs

CSCL 05H

United Kingdom research which is relevant to the assessment of vehicle ride comfort was reviewed. The findings reported in approximately 80 research papers are outlined, and an index to the areas of application of these studies is provided. The data obtained by different research groups are compared, and it is concluded that, while there are some areas of general agreement, the findings obtained from previous United Kingdom research are insufficient to define a general purpose ride comfort evaluation procedure. The degree to which United Kingdom research supports the vibration evaluation procedure defined in the current International Standard on the evaluation of human exposure to whole-body vibration is discussed. Author

N76-16775* Royal Aircraft Establishment, Farnborough (England). Human Engineering Div.
RIDE QUALITY AND INTERNATIONAL STANDARD ISO 2631 (GUIDE FOR THE EVALUATION OF HUMAN EXPOSURE TO WHOLE-BODY VIBRATION)
Geoff R. Allen. *In* NASA. Langley Res. Center The 1975 Ride Quality Symp. Nov. 1975 p 501-530 refs

CSCL 05H

The evolution of the standard, which is aimed at promoting research and production of more data, and providing some design guidance, is outlined and its contents summarized. Some of the assumptions and information on which it is based are analyzed. Its application to vehicle ride quality is considered in the context of the safety, efficiency and comfort of crew and passengers. The importance of establishing the precise criteria against which vibration limits are required is underlined, particularly the difficulties of first defining comfort and then postulating appropriate levels. Some current and future work related to improving the standard is outlined and additional suggestions offered. Author

N76-16776* Janeway Engineering Co., Detroit, Mich.
ANALYSIS OF PROPOSED CRITERIA FOR HUMAN RESPONSE TO VIBRATION
R. N. Janeway. *In* NASA. Langley Res. Center The 1975 Ride Quality Symp. Nov. 1975 p 531-563 refs

CSCL 05H

The development of criteria for human vibration response is reviewed, including the evolution of the ISO standard 2631. The document is analyzed to show why its application to vehicle ride evaluation is strongly opposed. Alternative vertical and horizontal limits for comfort are recommended in the ground vehicle ride frequency range above 1 Hz. These values are derived by correlating the absorbed power findings of Pradko and Lee with other established criteria. Special emphasis is placed on working limits in the frequency range of 1 to 10 Hz since this is the most significant area in ground vehicle ride evaluation. Author

N76-16777* Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Biodynamics and Bionics Div.
THE ISO STANDARD: GUIDE FOR THE EVALUATION OF HUMAN EXPOSURE TO WHOLE-BODY VIBRATION
H. E. VonGierke. *In* NASA. Langley Res. Center The 1975 Ride Quality Symp. Nov. 1975 p 565-580 refs

CSCL 05H

The international guideline is discussed in terms of safety and human tolerance. Charts for equal subjective vibration intensity, subjective judgement of equal fatigue, and severe discomfort boundaries are included. F.O.S.

N76-16778* Texas Univ., Austin.
AUTOMOBILE RIDE QUALITY EXPERIMENTS CORRELATED TO ISO-WEIGHTED CRITERIA
A. J. Healey, R. K. Young, and C. C. Smith. *In* NASA. Langley Res. Center The 1975 Ride Quality Symp. Nov. 1975 p 581-600 refs

CSCL 05H

As part of an overall study to evaluate the usefulness of ride quality criteria for the design of improved ground transportation systems an experiment was conducted involving subjective and objective measurement of ride vibrations found in an automobile riding over roadways of various roughness. Correlation of the results led to some very significant relationships between passenger rating and ride accelerations. The latter were collapsed using a frequency-weighted root mean square measure of the random vibration. The results suggest the form of a design criterion giving the relationship between ride vibration and acceptable automobile ride quality. Further the ride criterion is expressed in terms that relate to rides with which most people are familiar. The design of the experiment, the ride vibration data acquisition, the concept of frequency weighting and the correlations found between subjective and objective measurements are presented. Author

N76-16779* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
VIBRATION SIMULATOR STUDIES FOR THE DEVELOPMENT OF PASSENGER RIDE COMFORT CRITERIA
Thomas K. Dempsey and Jack D. Leatherwood. *In its* The 1975 Ride quality Symp. Nov. 1975 p 601-614 refs

CSCL 05H

A test program to determine the total discomfort associated with vehicle vibration is described. The program utilizes a three-degree-of-freedom vibration simulator to determine the effects of multifrequency and multiaxis vibration inputs. The approach to multifrequency vibration includes a separate consideration of the discomfort associated with each frequency component or band of the total spectrum and a subsequent empirical weighting of the discomfort components of these frequency bands when in various random combinations. The results are in the form of equal discomfort curves that specify the discomfort associated with discrete frequencies between 1 and 30 Hz and different acceleration levels. These results provide detailed information of the human discomfort response to increases in acceleration level for each frequency investigated. More importantly, the results provide a method for adding the discomfort associated with separate frequencies to give a total typification of the discomfort of a random spectrum of vibration. Author

N76-16780* Virginia Univ., Charlottesville.
SIMULATOR STUDIES AND PSYCHOPHYSICAL RIDE COMFORT MODELS
Ralph W. Stone, Jr. *In* NASA. Langley Res. Center The 1975 Ride Quality Symp. Nov. 1975 p 615-644 refs

CSCL 05H

An elementary psychophysical model to predict ride comfort was developed using flight and simulator data where subjects were exposed to six degrees of freedom. The model presumes that the comfort response is proportional to the logarithm of the stimulus above some threshold stimulus. In order to verify this concept of comfort modeling, it was necessary to obtain ride comfort data for single degree of freedom random motions and for combinations of random motions. Accordingly, a simulator program was performed at the NASA Langley Research Center to measure subjective comfort response ratings using one degree of freedom, two degrees of freedom, three degrees of freedom, and six degrees of freedom. An analysis of the single degree of freedom and two degrees of freedom data is presented. Preliminary models of ride comfort response for single degree of freedom random motions and for certain combinations of two degrees of freedom random motions were developed. Author

N76-16781*# Scientific Translation Service, Santa Barbara, Calif.
ATTEMPT TO UNDERSTAND ABSTRACTION
O. Kuelpe. Washington NASA Dec. 1975 14 p Transl. into ENGLISH from Ber. ueber den Kong. fuer Experimentelle Psychol. (West Ger.), v. 18, no. 21, 1904 p 56-68
(Contract NASw-2791)
(NASA-TT-F-16816) Avail: NTIS HC $3.50 CSCL 05E

A description is given of an experiment performed in 1900 to investigate the process of abstraction for optical objects exposed for a short time. The experimental procedure is discussed, and the experiment results are analyzed. Author

N76-16782*# North Carolina State Univ., Raleigh.
INDIVIDUAL DIFFERENCES IN HUMAN ANNOYANCE RESPONSE TO NOISE
Richard G. Pearson, Franklin D. Hart, and John F. OBrien [1976] 63 p refs
(Grant NGR-34-002-055)
(NASA-CR-144921) Avail: NTIS HC $4.50 CSCL 05E

One hundred sixty-six male and female adult subjects varying in age, occupation, educational level, race, and area of residence were exposed to and rated on the annoyance of six types of aviation and industrial noise stimuli in a simulated living room environment. Mean annoyance ratings to the noise stimuli varied considerably despite the fact that the stimuli levels in the test room were equated at the same peak sound pressure level, 82 db. A considerable, significant range of variation in annoyance ratings was noted across subjects. Factor analysis of the personality-attitude data resulted in identification of several useful factors for multiple regression prediction of annoyance, e.g., noise sensitivity, anti-aviation, noise-health, interference with routine,

phobic, imperturbable, and complainer. The results suggest that a generalized sensitivity to noise is a major determinant of the annoyance response. Author

N76-16783*# California Univ., La Jolla. Dept. of Neurosciences.
THE AUDITORY NEURAL NETWORK IN MAN
Robert Galambos [1975] 23 p refs
(Grants NGR-05-009-198; NS-10482)
(NASA-CR-146357) Avail: NTIS HC $3.50 CSCL 05E

The principles of anatomy and physiology necessary for understanding brain wave recordings made from the scalp are briefly discussed. Brain waves evoked by sounds are then described and certain of their features are related to the physical aspects of the stimulus and the psychological state of the listener. It is proposed that data obtained through probes located outside the head can reveal a large amount of detail about brain activity. It is argued that analysis of such records enables one to detect the response of the nervous system to an acoustic message at the moment of its inception at the ear, and to follow the progress of the acoustic message up through the various brain levels as progressively more complex operations are performed upon it. Even those brain events responsible for the highest level of signal processing - distinguishing between similar signals and making decisions about them - seem to generate characteristic and identifiable electrical waves. Author

N76-16784*# California Univ., La Jolla.
SELECTIVE ATTENTION AND THE AUDITORY VERTEX POTENTIAL. 1: EFFECTS OF STIMULUS DELIVERY RATE
Vincent L. Schwent, Steven A. Hillyard, and Robert Galambos [1975] 30 p refs
(Grants NGR-05-009-198; MH-25544-01)
(NASA-CR-146390) Avail: NTIS HC $4.00 CSCL 05E

Enhancement of the auditory vertex potentials with selective attention to dichotically presented tone pips was found to be critically sensitive to the range of inter-stimulus intervals in use. Only at the shortest intervals was a clear-cut enhancement of the latency component to stimuli observed for the attended ear. Author

N76-16785*# California Univ., La Jolla. Dept. of Neurosciences.
ELECTROPHYSIOLOGICAL MEASUREMENT OF HUMAN AUDITORY FUNCTION
Robert Galambos [1975] 27 p refs Sponsored by NASA and NIH
(NASA-CR-146387) Avail: NTIS HC $4.00 CSCL 05E

Contingent negative variations in the presence and amplitudes of brain potentials evoked by sound are considered. Evidence is produced that the evoked brain stem response to auditory stimuli is clearly related to brain events associated with cognitive processing of acoustic signals since their properties depend upon where the listener directs his attention, whether the signal is an expected event or a surprise, and when sound that is listened-for is heard at last. G.G.

N76-16786*# California Univ., La Jolla. Dept. of Neurosciences.
SELECTIVE ATTENTION AND THE AUDITORY VERTEX POTENTIAL. 2: EFFECTS OF SIGNAL INTENSITY AND MASKING NOISE
Vincent L. Schwent, Steven A. Hillyard, and Robert Galambos [1975] 23 p refs Sponsored in part by NSF
(Grants NGR-05-009-198; MH-25594-01)
(NASA-CR-146389) Avail: NTIS HC $3.50 CSCL 05E

A randomized sequence of tone bursts was delivered to subjects at short inter-stimulus intervals with the tones originating from one of three spatially and frequency specific channels. The subject's task was to count the tones in one of the three channels at a time, ignoring the other two, and press a button after each tenth tone. In different conditions, tones were given at high and low intensities and with or without a background white noise to mask the tones. The N sub 1 component of the auditory vertex potential was found to be larger in response to attended channel tones in relation to unattended tones. This selective enhancement of N sub 1 was minimal for loud tones presented without noise and increased markedly for the lower tone intensity and in noise added conditions. Author

N76-16787*# California Univ., La Jolla. Dept. of Neurosciences.
BRAINSTEM AUDITORY EVOKED RESPONSES IN MAN. 1: EFFECT OF STIMULUS RISE-FALL TIME AND DURATION
Kurt Hecox, Nancy Squires, and Robert Galambos [1975] 32 p refs
(Grants NGR-05-009-198; NS-10482-01)
(NASA-CR-146391) Avail: NTIS HC $4.00 CSCL 05E

Short latency (under 10 msec) evoked responses elicited by bursts of white noise were recorded from the scalp of human subjects. Response alterations produced by changes in the noise burst duration (on-time) inter-burst interval (off-time), and onset and offset shapes are reported and evaluated. The latency of the most prominent response component, wave V, was markedly delayed with increases in stimulus rise-time but was unaffected by changes in fall-time. The amplitude of wave V was insensitive to changes in signal rise-and-fall times, while increasing signal on-time produced smaller amplitude responses only for sufficiently short off-times. It is concluded that wave V of the human auditory brainstem evoked response is solely an onset response. Author

N76-16788*# Columbia Univ., Franklin Square, N.Y.
SPECIAL ANALYSIS OF COMMUNITY ANNOYANCE WITH AIRCRAFT NOISE REPORTED BY RESIDENTS IN THE VICINITY OF JFK AIRPORT, 1972
Paul N. Borsky Sep. 1975 85 p refs
(Contract NAS1-13663)
(NASA-CR-132678) Avail: NTIS HC $5.00 CSCL 05E

During the summer of 1972, about 1500 residents were interviewed twice in 11 communities near JFK airport. Detailed aircraft operations reports were also collected for this period, and an effort has been made to analyze recorded human response data in relation to a number of physical exposure parameters. A series of exposure indexes, based on an arithmetic integration of aircraft operations, were correlated with summated aircraft noise annoyance responses. None of these correlations were as good as the CNR index which assumes a logrithmetic integration of numbers of aircraft exposures and includes a day-night differential weighting of 10:1. There were substantial variations in average annoyance responses among communities with similar CNR exposures, substantiating previous findings that attitudinal and other personal variables also play an important role in determining annoyance differences. Author

N76-16789# National Physical Lab., Teddington (England). Div. of Computer Science.
AN AUTOMATED MEDICAL HISTORY-TAKING PROJECT WITH VIDEOTAPE INTERVIEWING OF IMMIGRANT PSYCHIATRIC PATIENTS
C. R. Evans, N. Masters (Guys Hosp. Med. School), H. B. Milne (Lynfield Mt. Hosp.), and M. Hashim (Lynfield Mt. Hosp.) Apr. 1975 9 p refs
(NPL-Com-79) Avail: NTIS HC $3.50

A project aimed at interviewing patients without human intervention is described. The questionnaire is prerecorded on videotape, and the patient operates buttons on a response box. The replies represented by a choice from 4 tones are recorded on a cassette tape. It is shown that the system can also be effectively used to interview patients in languages other than English. Results are discussed for Asian male patients. ESA

N76-16790# Army Personnel Research Committee, London (England).
THE EFFECT OF A FILTERED CONTROL ON OPERATOR'S HAND TREMOR
M. Waygood 1974 16 p refs
(AD-A014105; APRC-72/CS7; DRIC-BR47799) Avail: NTIS CSCL 05/5

Twelve operators compensated for errors they produced while

holding a spot central in a stationary square target. Filtering their control movements obtained from strain gauges increased their proficiency compared with a condition in which the control movements were presented at a gain of 189. It is argued that filtering of the operator's control demands may improve his performance, when the target is stationary. GRA

N76-16791# Texas Christian Univ., Fort Worth. Inst. for the Study of Cognitive Systems.
LEARNING STRATEGY TRAINING PROGRAM: QUESTIONS AND ANSWERS FOR EFFECTIVE LEARNING Final Report, Jan. 1974 - May 1975
Donald F. Dansereau, Gary L. Long, Barbara A. McDonald, Tomme R. Actkinson, Karen W. Collins, Selby H. Evans, Alice M. Ellis, and Stephen Williams Jun. 1975 202 p refs
(Contract F41609-74-C-0013; AF Proj. 1121)
(AD-A014725; AFHRL-TR-75-48) Avail: NTIS CSCL 05/10

The report presents an effective integrated learning strategy program emphasizing a connection technique employing questions and answers. The components were derived from a review of the educational and psychological literature and from an analysis of the responses to the learning strategy inventory, which were conducted during this same research effort. Also, two other training packages (visual imagery and paraphrasing connection) were evaluated along with this package in a controlled experiment. This program improved long term retention of factual material. With appropriate insertions of blank pages this report can be used to provide learning strategy training. GRA

N76-16792# Texas Christian Univ., Fort Worth. Inst. for the Study of Cognitive Systems.
LEARNING STRATEGY TRAINING PROGRAM: VISUAL IMAGERY FOR EFFECTIVE LEARNING Final Report, Jan. 1974 - May 1975
Donald F. Dansereau, Gary L. Long, Barbara A. McDonald, Tomme R. Actkinson, Karen W. Collins, Selby H. Evans, Alice M. Ellis, and Stephen Williams Jun. 1975 200 p refs
(Contract F41609-74-C-0013; AF Proj. 1121)
(AD-A014724; AFRHL-TR-75-47) Avail: NTIS CSCL 05/10

The report presents an effective integrated learning strategy program emphasizing a connection technique using visual imagery. The components were derived from a review of the educational and psychological literature and from an analysis of the responses to the learning strategy inventory, which were conducted during this same research effort. Also, two other training packages (paraphrasing and question-answer connection) were evaluated along with this package in a controlled experiment. This program improved long term retention of factual material and appeared to help lower reading ability students more than higher reading ability students. With appropriate insertions of blank pages this report can be used to provide learning strategy training. GRA

N76-16793# Texas Christian Univ., Fort Worth. Inst. for the Study of Cognitive Systems.
LEARNING STRATEGY TRAINING PROGRAM: PARAPHRASING STRATEGY FOR EFFECTIVE LEARNING Final Report, Jan. 1974 - May 1975
Donald F. Dansereau, Gary L. Long, Barbara A. McDonald, Tomme R. Actkinson, Karen W. Collins, Selby H. Evans, Alice M. Ellis, and Stephen Williams Jun. 1975 201 p refs
(Contract F41609-74-C-0013; AF Proj. 1121)
(AD-A014723; AFHRL-TR-75-46) Avail: NTIS CSCL 05/10

The report presents an effective integrated learning strategy program emphasizing a connection technique using paraphrasing. The components were derived from a review of the educational and psychological literature and from an analysis of the responses to the learning strategy inventory, which were conducted during this same research effort. Also, two other training packages (visual imagery and question-answer connection) were evaluated along with this package in a controlled experiment. The results of this experiment showed improved long term retention, when using paraphrasing for the trained group, of 55% over an untrained control group. With appropriate insertion of blank pages this report can be used to provide learning strategy training. GRA

N76-16794# Texas Christian Univ., Fort Worth. Inst. for the Study of Cognitive Systems.
EFFECTIVE LEARING STRATEGY TRAINING PROGRAM: DEVELOPMENT AND ASSESSMENT Final Report, Jan. 1974 - May 1975
Donald F. Dansereau, Gary L. Long, Barbara A. McDonald, Tomme R. Actkinson, Alice M. Ellis, Karen W. Collins, Stephen Williams, and Selby H. Evans Brooks AFB, Tex. AFHRL Jun. 1975 81 p refs
(Contract F41609-74-C-0013; AF Proj. 1121)
(AD-A014722; AFHRL-TR-75-41) Avail: NTIS CSCL 05/10

Potentially effective and trainable learning strategies were identified by an analysis of a specially developed learning strategy inventory and a review of educational and psychological review literature. Four aspects of the learning process suggested the usefulness of special training. These were the identification of important or unfamiliar material, the applications of techniques for the comprehension and retention of this information, the efficient retrieval of information and the skill in coping with distractions during the foregoing processes. A training program was developed for teaching selected specific strategies, including the three alternative comprehension/retention strategies of paraphrasing, question-answering, and the use of visual imagery, in such a way as to compare the three alternative connection techniques. The results indicated that minimal strategy training showed significant results in long term retention, although no reliable differences were found in immediate testing. Further refining of the techniques was recommended. An effective strategy training program suitable for implementation in technical training was created, modified, and assessed. GRA

N76-16795# Texas Christian Univ., Fort Worth. Inst. for the Study of Cognitive Systems.
LEARNING STRATEGY INVENTORY DEVELOPMENT AND ASSESSMENT Final Report, Jan. 1974 - May 1975
Donald F. Dansereau, Gary L. Long, Barbara A. McDonald, Tomme R. Actkinson, Karen W. Collins, Selby H. Evans, Alice M. Ellis, and Stephen Williams Jun. 1975 111 p refs
(Contract F41609-74-C-0013; AF Proj. 1121)
(AD-A014721; AFHRL-TR-75-40) Avail: NTIS CSCL 05/10

A learning strategy inventory composed of 201 multiple-choice items, based upon similar work and aspects suggested from a literature review, was developed. Correlational and factor analyses (based on approximately 200 students) were performed to provide a basis for identifying trainable learning strategies. Four phases of the learning process were identified and incorporated into a learning strategy training program (reported elsewhere). The learning inventory provides a significant first step in the development of a more general instrument for diagnosing learning strategy inadequacies in specific individuals. GRA

N76-16796# Air Force Human Resources Lab., Brooks AFB, Tex.
DIMENSIONS OF JOB SATISFACTION, INITIAL DEVELOPMENT OF THE AIR FORCE OCCUPATIONAL ATTITUDE INVENTORY Interim Report, 1 Jul. 1972 - 30 Jun. 1974
Thomas C. Tuttle, R. Bruce Gould, and Joe T. Hazel Jun. 1975 37 p refs
(AF Proj. 7734)
(AD-A014796; AFHRL-TR-75-1) Avail: NTIS CSCL 05/9

The report describes the initial development of the Air Force Occupational Attitude Inventory. From a selective review of studies that ascribed to a multi-faceted approach, several categories or content areas were identified. An extensive item pool was prepared and reviewed by judges to provide information regarding item-category agreement, item ambiguity, and item redundancy. The revised version of the inventory consisted of 348 items distributed across 35 facets. An 8-point bi-polar rating scale without a neutral point was developed for rating the items. Details regarding the final version of the inventory booklet, suitable for administration to airmen, are provided. The entire listing of 348 items and descriptions of the 35 categories are included in the report for possible use of other researchers. Subsequent actions and future uses of the Occupational Attitude Inventory are discussed. GRA

N76-16797# Battelle Human Affairs Research Centers, Seattle, Wash.
DEFINING RESEARCH NEEDS TO INSURE CONTINUED JOB MOTIVATION OF AIR TRAFFIC CONTROLLERS IN FUTURE AIR TRAFFIC CONTROL SYSTEMS Final Report
Stanley M. Nealey, George C. Thornton, III (Colo. State Univ.), William S. Maynard, Michael K. Lindell, Richard Hodapp (Colo. State Univ.), L. T. Love, L. B. Myers, R. E. Abrams, and J. A. Hebert Apr. 1975 130 p refs
(Contract DOT-FA74WAI-499)
(AD-A014719) Avail: NTIS CSCL 05/10

The study was made necessary by FAA plans to progressively introduce automated equipment into the ATC system over the next ten years. Such equipment is expected to bring about striking changes in the actual work activities of ATCs in controlling aircraft. Experience with the introduction of NAS Stage A and ARTS III equipment has focused concern on th3 motivational reaction of ATCs to automated equipment. The objective of this study was to forecast the types of motivational problems likely to be experienced in the face of increasing automation and to suggest social science research necessary to the definition and amelioration of these problems. GRA

N76-16798# Human Engineering Labs., Aberdeen Proving Ground, Md.
PILOT PERFORMANCE IN A HELICOPTER SIMULATOR Final Technical Memorandum
John P. Waugh Sep. 1975 336 p refs
(AD-A017441; HEL-TM-23-75) Avail: NTIS CSCL 14/2

Six Army helicopter pilots, instrument rated, flew a difficult precision instrument flight pattern in this Laboratory's GAT-2H helicopter simulator. For each flight, each subject was given a different combination of thrust to weight, cyclic control sensitivity and cyclic spring centering force gradient condition making up an incomplete, balanced block-type experimental design. Several error measurements were recorded during the trials; however, none could be satisfactorily utilized either to predict accuracy of performance or to be an indicator of relative workload. An unanticipated large variation of measures taken is thought to be the cause. Additional approaches and further study of the problem is recommended. GRA

N76-16799# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PSYCHOLOGY AND PSYCHOPATHOLOGY OF SOLITUDE
O. N. Kuznetsov and V. I. Lebedev 30 Jan. 1975 408 p refs Transl. into ENGLISH of the book "Psikhologiya i Psikhopatologiya Odinochestva" Moscow, Izd. Meditsina, 1972 393 p
(AD-A007454; FTD-MT-24-1509-74) Avail: NTIS CSCL 05/10

Research on the physiological and psychic changes in animals and man under various conditions of isolation is summarized. Experimental data and literature materials are used to illuminate the problem of solitude in its psychological, psychiatric, philosophical, and sociological aspects. Measures for the prevention of neuropsychic illnesses are presented. Author (GRA)

N76-16800# Navy Personnel Research and Development Center, San Diego, Calif.
THE EFFECTS OF PRACTICE AND POSITIONAL VARIABLES IN THE ACQUISITION OF A PHYSICALLY COMPLEX PSYCHOMOTOR SKILL Interim Report, Jul. 1974 - Jan. 1975
Macy L. Abrams, Harvey B. Schow, and Jon K. Grice Jul. 1975 30 p refs
(AD-A015282; NPRDC-TR-76-7) Avail: NTIS CSCL 05/10

The investigation (1) evaluates distributed/massed practice schedules for learning a physically complex psychomotor skill within the constraints of a real-world learning environment and (2) determines if there are interaction effects between practice and the positional variables in the acquisition of the skill. Distributed/massed practice was studied from two aspects: trial length and session length. GRA

N76-16801*# AiResearch Mfg. Co., Torrance, Calif.
PORTABLE OXYGEN SUBSYSTEM (POS) Final Report
Dec. 1975 94 p
(Contract NAS9-14457)
(NASA-CR-147401; Rept-75-12328) Avail: NTIS HC $5.00 CSCL 06K

Concept selection, design, fabrication, and testing of a Portable Subsystem (POS) for use in space shuttle operations are described. Tradeoff analyses were conducted to determine the POS concept for fabrication and testing. The fabricated POS was subjected to unmanned and manned tests to verify compliance with statement of work requirements. The POS used in the development program described herein met requirements for the three operational modes -- prebreathing, contaminated cabin, and personnel rescue system operations. Author

N76-16802*# Hamilton Standard, Windsor Locks, Conn.
PORTABLE OXYGEN SUBSYSTEM Final Report
Dec. 1975 241 p refs
(Contract NAS9-14458)
(NASA-CR-147428; SP05T75) Avail: NTIS HC $8.00 CSCL 06K

The concept and design of a portable oxygen device for use in the space shuttle orbiter is presented. Hardware fabrication and acceptance tests (i.e., breadboard models) are outlined and discussed. Optimization of the system (for weight, volume, safety, costs) is discussed. The device is of the rebreather type, and provides a revitalized breathing gas supply to a crewman for denitrogenization and emergency activities. Engineering drawings and photographs of the device are shown. Author

N76-16803*# Hamilton Standard, Windsor Locks, Conn.
DESIGN, DEVELOPMENT, AND FABRICATION OF A PROTOTYPE ICE PACK HEAT SINK SUBSYSTEM. FLIGHT EXPERIMENT PHYSICAL PHENOMENA EXPERIMENT CHEST Final Report
George J. Roebelen, Jr. and W. Clark Dean, II Dec. 1975 100 p refs
(Contract NAS2-8665)
(NASA-CR-137768; SVHSER6784) Avail: NTIS HC $5.00 CSCL 06K

The concept of a flight experiment physical phenomena experiment chest, to be used eventually for investigating and demonstrating ice pack heat sink subsystem physical phenomena during a zero gravity flight experiment, is described. Author

N76-16804*# Joint Publications Research Service, Arlington, Va.
CONSTRUCTING THE MOTIONS OF MANIPULATING SYSTEMS
A. A. Kobrinskiy and A. Ye. Kobrinskiy Washington NASA Jan. 1976 6 p refs Transl. into ENGLISH from Dokl. Akad. Nauk USSR (Moscow), v. 224, no. 5, 11 Oct. 1975 p. 1030-1033
(NASA Order W-13183)
(NASA-TT-F-16859) Avail: NTIS HC $3.50 CSCL 05H

Algorithms for the control of mechanical hands are reported. Author

N76-16805# Aeronautical Research Inst. of Sweden, Stockholm.
A METHOD FOR THE MEASUREMENT OF ENERGY ABSORPTION IN THE HUMAN HAND USING VARIOUS TYPES OF HAND TOOLS
Ingmar Johnson 1975 21 p refs
(FFA-Memo 97) Avail: NTIS HC $3.50

To correlate the ailment commonly known as vibration induced white fingers, observed among manual workers, to the energy absorbed in the hand, a method for the measurement of vibrational energy dissipated in the human hand using certain types of hand tools such as pneumatic roll drills was developed, based on measurements of vibrational force and acceleration as

close as possible to the hand palm surface. A special handle equipped with force transducers and accelerometers corresponding to each one of three orthogonal directions in space, was used. The effective portion of the handle has low weight to make the influence of the handle mass negligible compared with the mass of the hand. By integration of the acceleration signal, the corresponding instantaneous velocity is obtained. Analog multiplication of the force and velocity vectors produce a single output proportional to the energy dissipated per unit time or the dissipated power. The method is generally applicable to complex vibrations including random vibrations. Dissipated energy may be obtained quantitatively by calibrating the instrumentation using sinusoidal vibrations with known amplitude and frequency. Author ESA

N76-17781 Wisconsin Univ., Madison.
HIGH-PRESSURE TEMPERATURE-JUMP KINETIC STUDIES OF ENZYME MODEL REACTIONS Ph.D. Thesis
Andrew Dingan Yu 1975 135 p
Avail: Univ. Microfilms Order No. 75-20800

The activation volumes of Ni(II) and Co(II) versus imidazole, alpha-and beta-aminobutyric acids were measured. The results show agreement for the energy and volume of activation with those predicted by the electrostatic theory. The sterically controlled mechanism was also found to be dissociative in nature with no apparent change in the activation parameters. Cyclodextrins have enzyme like catalytic activity because they can bind substrates in their molecular cavity. The activation volume of cyclohexaamylose with azo dyes is almost zero. With the recent crystallographic data, it is concluded that the cavity of CHA is not hydrophobic in nature. The rate determining step of the complex formation is the interaction between the substrate and the cyclodextrin ring. Dissert. Abstr.

N76-17782*# Food and Drug Administration, Cincinnati, Ohio. Food Research Lab.
ECOLOGY AND THERMAL INACTIVATION OF MICROBES IN AND ON INTERPLANETARY SPACE VEHICLE COMPONENTS Quarterly Progress Report, 1 Apr. - 30 Jun. 1975
A. L. Reyes and J. E. Campbell Sep. 1975 26 p refs
(NASA Order W-13411)
(NASA-CR-146401; QPR-41) Avail: NTIS HC $4.00 CSCL 06M

Spores of Bacillus subtilis var. niger were heat treated in aqueous suspension at 90 C, and observed for morphological changes and loss of viability. The 5 logs reduction that occurred in broth at 90 min required 210 min in buffered water. Five characteristic changes observed after spores were exposed 120 min at 90 C in buffered water were: (1) 90% loss of spore viability, (2) 5% stainability, (3) 76% increase in spore size (as observed by scanning electron microscopy), (4) 21% of spore areas remaining refractile, and (5) an increase of 77% in packed cell volume (PCV). Stainability and PCV changes were recognized only after secondary exposure in broth. Extended heat exposure (3 h at 90 C) resulted in 99% loss of spore viability and 99% loss of stainability. After 4 hours of heat exposure, 90% of the cells disintegrated. These results suggest that early germinal changes occurr concurrently with the early changes in the heat susceptibility of dormant spores. Author

N76-17783# Baylor Univ., Houston, Tex. Dept. of Pediatrics.
PHYSICAL CHEMICAL STATE OF WATER IN LIVING CELLS Annual Report, 1 Aug. 1974 - 31 Jul. 1975
Carlton F. Hazlewood 15 Sep. 1975 13 p refs
(Contract N00014-75-A-0017; NR Proj. 105-788)
(AD-A014929; AR-1) Avail: NTIS CSCL 06/16

The role of water in basic physiological processes is defined. A fundamental understanding of the physical chemical state of water in living cells is established. The inter-relationship between various physiological states and the physical state of water in cellular and subcellular fractions is studied. Particular emphasis is placed on defining the role of water in cellular accumulation and exclusion of ions and other solutes. GRA

N76-17784 Florida Univ., Gainesville.
AUTOMATED ANALYSIS OF BIOLOGICAL RHYTHMS IN THE HUMAN ELECTROENCEPHALOGRAM Ph.D. Thesis
Barry Patrick Keane 1975 256 p
Avail: Univ. Microfilms Order No. 76-4245

Biological rhythms in the human electroencephalogram are analyzed by using modern hardware and software techniques. Based essentially on their frequency range, several types of EEG activity are defined, ranging from delta (.5 to 2.0 Hz) to beta (15 to 33 Hz). Several methods of detection of the above activities are discussed, including the technique used for this study, based on zero crossing and pattern detection. Results show a number of previously unknown ontogenetic patterns in the ultradian occurrences of alpha, beta, delta, sigma, and rapid eye movement (REM) activity. Dissert. Abstr.

N76-17786# Advisory Group for Aerospace Research and Development, Paris (France).
EFFECTS OF LONG DURATION NOISE EXPOSURE ON HEARING AND HEALTH
Milton A. Whitcomb, ed. (NSF) Nov. 1975 94 p refs Presented at the Aerospace Med. Panel Specialists Meeting, Toronto, 5 May 1975
(AGARD-CP-171) Avail: NTIS HC $5.00

There can be no doubt that noise exposures of durations greater than eight hours present a hazard to the hearing of air crews flying noisy aircraft and, particularly, for those more susceptible crew members. Noise reduction around NATO airports to insure public health is examined. Data are examined on the incidence of stress-induced pathologies such as ulcers or emotional disorders for those exposed to long-duration noise, as compared to nonnoise exposed individuals. Flight crews exposed to such long durations of noise were monitored both audiometrically and for abnormal incidence of cardiovascular disease, ulcers, and other psychosomatic complaints. Long-duration noise exposure to the moderate levels of noise that occur in aircraft cockpits was also studied. The fundamental mechanisms causing cochlear damage (mechanical and biological) are critically examined.

N76-17787 Ohio State Univ., Columbus. Dept. of Otolaryngology.
MODE OF COCHLEAR DAMAGE BY EXCESSIVE NOISE, AN OVERVIEW
David J. Lim and William Melnick *In* AGARD Effects of Long Duration Noise Exposure on Hearing and Health Nov. 1975 6 p refs
(Contract F33615-74-C-4049)

Damage to the cochlea is examined and is believed to be caused by a physical or metabolic stress exerted on the sensory cells. Evidence to support both mechanisms is overwhelming, and is reviewed. Injury can be brought about by the chemical or metabolic alteration in the surrounding medium. Besides apparent mechanical damage inflicted on the organ of Corti by the acoustic hyperstimulation, the evidence of metabolic damage to the sensory cells is subtle. The subtle changes include: (1) proliferation and vacuolization of endoplasmic reticulum in sensory cells, (2) swelling of mitochondria in both sensory cells and afferent nerve endings, (3) morphological alteration of stereocilia, and (4) swelling and degeneration of stria vascularis. These findings imply that the high-energy-yielding enzyme systems are rendered inoperative in these cells, resulting in cell degeneration. Photomicrographs are shown. Author

N76-17788 Ohio State Univ., Columbus. Dept. of Otolaryngology.
TTS IN MAN FROM A 24-HOUR EXPOSURE TO AN OCTAVE BAND OF NOISE CENTERED AT 4 kHz
William Melnick *In* AGARD Effects of Long Duration Noise Exposure on Hearing and Health Nov. 1975 8 p refs

(Contract F33615-71-C-4049)
(AMRL-TR-75-3)

Seven men were exposed to 24 hours of continuous noise in a sound field. The noise was an octave band centered at 4 kHz at two octave band levels, 80 and 85 db. Hearing thresholds

were measured in one ear at 11 test frequencies ranging from 250 to 10,000 Hz prior to exposure and at selected intervals during and after exposure. Temporary threshold shift (TTS) reached asymptotic levels between 8 and 12 hours of exposure. Results indicate that maximum TTS occurs at 4 and 6 kHz. Asymptotic levels at the 80 db exposure level are 9.7 db for 4 kHz and 7.7 db for 6 kHz. With the 85 db noise level, these levels are 18.4 db and 16.5 db, respectively. Threshold shift for this subject group is less than would be expected from results of previous investigations, and is attributed to subject sampling bias. Author

N76-17789 Italian Air Force Medical Service of the 2d Air Region, Rome. Sanitary Group - 1st Aerobrigade.

PROTECTIVE EFFECTS IN MEN OF BRAIN CORTEX GANGLIOSIDES ON THE HEARING LOSS INDUCED BY HIGH LEVELS OF NOISE

G. Maniero and G. A. Molinari (Padua Univ., Italy) *In* AGARD Effects of Long Duration Noise Exposure on Hearing and Health Nov. 1975 5 p refs

It is known that the prolonged exposure to noise of intensity greater than 70-80 decibels produces a temporary rise of the acoustic threshold (TTS). Gangliosides, (glycolipids which seem to interfere with the transmission of nervous impulse), were used in preventing TTS rise. By means of ganglioside administration, a possible interference on the traumatizing effect of noise on the cochlea was observed and studied. Following otologic and audiometric examination, 20 healthy male subjects were chosen. The TTS2 was calculated, both in basal conditions and after ganglioside administration. Results indicate that the gangliosides, administered in opportune doses and modalities, are capable of preventing in all subjects the physiological rise in the hearing threshold after exposure to noise. In contrast, the nontreated subjects in the same experimental conditions have either the same TTS2 or show a large shift. Therefore, the positive failure in shift, occuring in the treated patients, is most probably due to ganglioside effect. Author

N76-17790 Minnesota Univ., Minneapolis. Hearing Research Lab.

STUDIES OF ASYMPTOTIC TTS

W. Dixon Ward *In* AGARD Effects of Long Duration Noise Exposure on Hearing and Health Nov. 1975 7 p refs Sponsored by Natl. Inst. for Occupational Safety and Health

Ten young normal-hearing listeners were subjected to a series of exposures to 4000-Hz noise for periods ranging from 2 to 24 hours. The asymptotic TTS (temporary threshold shift) was always reached in 8-12 hours with no suggestion of a sharp increase between 8 and 24 hours. Little difference could be seen in the rate of recovery from the TTS produced by 8- and 24-hour exposures. Results indicate that exposures longer than 8 hours are not unusually hazardous. If there is an increased risk of eventual permanent hearing damage from repeated daily exposures longer than 8 hours, it probably comes from the fact that as the daily exposure becomes longer than 8 hours, the quiet interval before the next exposure is shortened, so that the next day's exposure is begun with the auditory system still in a fatigued state. Author

N76-17791 Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

ASYMPTOTIC BEHAVIOR OF TEMPORARY THRESHOLD SHIFT DURING EXPOSURE TO LONG DURATION NOISES

D. L. Johnson, C. W. Nixon, and M. R. Stephenson *In* AGARD Effects of Long Duration Noise Exposure on Hearing and Health Nov. 1975 6 p refs

Exposure to a constant noise level (pink noise, i.e., jet aircraft noise) for more than 16 hrs has been shown by many investigators to cause a Temporary Threshold Shift (TTS) in hearing that remains constant. This behavior, which is independent of exposure duration, is called Asymptotic TTS. Data are given which show that although TTS may remain constant, the recovery of hearing back to normalcy does depend on the duration of the exposure. Significant differences in recovery between a 24 hr exposure and a 48 hr exposure were observed. It is believed that for hearing conservation purposes, the time Air Force personnel should be allowed to recover from long duration noise exposures in quiet depends on the exposure duration. Suggested guidelines for assuring recovery of Asymptotic TTS are given and the research program aimed at improving these guidelines is discussed. Author

N76-17792 Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario). Behavioral Sciences Div.

THE INCIDENCE OF TEMPORARY AND PERMANENT HEARING LOSS AMONG AIRCREWS EXPOSED TO LONG-DURATION NOISE IN MARITIME PATROL AIRCRAFT

S. E. Forshaw *In* AGARD Effects of Long Duration Noise Exposure on Hearing and Health Nov. 1975 7 p refs

(DCIEM-75-RP-1073)

The CP-107 Argus has been in operation with the Canadian Forces since 1957 as a long-range maritime patrol aircraft. The endurance capability of the aircraft is at least 24 hours at reconnaissance altitudes and speeds. Flight durations from 12 to 20 hours occur routinely, during which ambient noise levels at various crew and rest stations range from 90 to 99 dBA. An assessment of crew and operational problems arising from long-duration flights in the Argus shows that about half of the crew sustain temporary threshold shifts in excess of levels considered to be acceptable for long-term exposure. The hearing levels of 223 pilots, navigators and flight engineers were studied with career flying times in the Argus ranging from 2500 to 10,000 hours. Results of the study suggest that repeated long-duration noise exposure, as experienced in the aircraft, are not any more deleterious to hearing thresholds than is repeated exposure, at approximately equivalent intensity levels, in short- and medium-range aircraft. Author

N76-17793 Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome (Italy).

PSYCHO-PHYSICAL PERFORMANCE OF AIR FORCE TECHNICIANS AFTER LONG DURATION NOISE EXPOSURE

Cesare A. Ramacci and Paolo Rota *In* AGARD Effects of Long Duration Noise Exposure on Hearing and Health Nov. 1975 3 p refs

Psychological and psycho-physiological tests were carried out (Toulouse Pieron test, flicker fusion test, reaction time) on 20 Air Force technicians, on duty at an aircraft maintenance and flight line, exposed to high level noise. Work conditions considered were: (1) continuous exposition to noise of about 120 db, for one hour and half; and (2) continuous exposure for five hours to 60-80 db noise, with transient increases up to 90-115 db. The technicians used, when necessary, individual or collective ear protection. The technicians were divided into 3 groups and given specific tasks to perform. The tests, carried out before and after noise exposure, do not show significant changes of task performance. Author

N76-17794 Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).

THE EFFECTS OF EAR PROTECTORS ON SOME AUTOMATIC RESPONSES TO AIRCRAFT AND IMPULSIVE NOISE

G. R. Froehlich *In* AGARD Effects of Long Duration Noise Exposure on Hearing and Health Nov. 1975 5 p

Three different types of ear protectors were evaluated for protection against jet aircraft noise and other noise. Autonomic nervous system responses were measured for 25 subjects who participated in the study. Peripheral blood flow and electrodermal responses were also measured. Jet aircraft noise levels of 95 db and other noises (a pistol shot) of 130 db were provided. Subjects were asked to select the ear protector giving the greatest protection. Results are presented and discussed. J.R.T.

N76-17795 Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome (Italy).

INFLUENCE OF THE NOISE ON CATECHOLAMINE

EXCRETION
G. Paolucci *In* AGARD Effects of Long-Duration Noise Exposure on Hearing and Health Nov. 1975 2 p

Aviation specialists were exposed daily to high noises and fully protected against hearing damage by ear plugs. The exposed people were divided in two groups of ten subjects, each one exposed to different noisy conditions. One group was exposed to continuous and steady noise of 120 db for 1 hour and 1/2 hour, and the other was exposed to intermittent noise of 80-100 db for 5 hours, with intervals between impulsive bursts of 20 feet, lasting each only a few seconds. The subjective tolerance was good and no disturbance or fatigue reactions appeared at the end of the exposure. Urinary catecholamine excretion was assayed the day before the test (in noiseless place) and the next one at the end of the exposure. Results indicate that no change in catecholamine release occurs upon trained people with hearing fully protected. Author

N76-17796 Naval Regional Medical Center, San Diego, Calif. Dept. of Otolaryngology.
EFFECTS OF NOISE EXPOSURE
Robert W. Cantrell *In* AGARD Effects of Long Duration Noise Exposure on Hearing and Health Nov. 1975 13 p refs

It is known that noise can damage the inner ear, result in hearing loss, be a source of annoyance, disturb sleep, and interfere with speech. There is some evidence that it may adversely affect mental health, the cardiovascular system, basic biochemistry, and decrease work performance. Current knowledge is reviewed of how intensity, duration and frequency composition of noise affects the auditory, annoyance, sleep and speech interference, psychological and sociological responses in man. Author

N76-17797 Naval Regional Medical Center, San Diego, Calif. Dept. of Otolaryngology.
PHYSIOLOGICAL EFFECTS OF NOISE
Robert W. Cantrell *In* AGARD Effects of Long Duration Noise Exposure on Hearing and Health Nov. 1975 11 p refs

The effect of noise on the biochemistry of the body, the cardiovascular system, and the organ systems controlled by the autonomic nervous system are examined. Noise serves as a stressful stimulus which provokes the General Adaption Syndrome, and is one of the several stressful stimuli which activate this syndrome via the hypothalmus to the pituitary which produces ACTH resulting in increased adrenocortical activity. There is considerable evidence to support this concept, and this theory along with recently carefully controlled studies, are reviewed. Author

N76-17798 Army Aeromedical Research Lab., Fort Rucker, Ala.
AN INVESTIGATION OF AIRCRAFT VOICE COMMUNICATION SYSTEMS AS SOURCES OF INSIDIOUS LONG-TERM ACOUSTIC HAZARDS
Robert T. Camp, Jr., Ben T. Mozo, and James H. Patterson *In* AGARD Effects of Long Duration Noise Exposure on Hearing and Health Nov. 1975 6 p

The acoustic output of voice communication systems was measured helicopter during training flights. The results of analyses of samples of aircraft voice communication systems noise are examined. Specifically discussed are ear protecting devices (helmets) used to reduce cockpit noise and passenger compartment noise. It is found that the microphones in the helmets emit sound levels which are harmful over a long period of time. Author

N76-17799 Universitaetsklinikum Essen (West Germany).
PHYSIOLOGICAL RESPONSES DUE TO NOISE IN INHABITANTS AROUND MUNICH AIRPORT
Gerd Jansen *In* AGARD Effects of Long Duration Noise Exposure on Hearing and Health Nov. 1975 5 p

Results are examined of an interdisciplinary research study on aircraft noise effects on inhabitants around German airports. A pilot study (around Hamburg airport) and a main study (around Munich airport) were conducted by acoustical, demographic, social scientific, psychological, physiological and medical sections of scientists. It was found out that, in general, there is no adaptation to aircraft noise. A linear relation exists between increasing noise stimuli (combined noise, exposure, measure of noise levels, and number of flyovers) and human reactions. A discussion of physiological results leads to the opinion that physiological reactions are more related to sound levels whereas the 'whole reaction' (annoyance, blood pressure etc.) is more related to combined noise exposure measures. Author

N76-17800# Naval Electronic Systems Command, Washington, D.C.
NAVY SPONSORED ELF BIOLOGICAL AND ECOLOGICAL RESEARCH SUMMARY
Mar. 1975 64 p
(AD-A015299) Avail: NTIS CSCL 06/8

ELF is the Navy's extremely low frequency submarine communications system. The booklet summarizes the progress of Navy sponsored biological/ecological research studies initiated to determine the effects of electromagnetic fields in the ELF range, and lists the publications of each principal investigator. Most of the studies in this booklet were conducted at electric and/or magnetic field levels in excess of the ELF system levels of 0.07 volt per meter and 0.2 gauss. To date, results show no significant adverse effects on humans, animals, plants, or microorganisms at electromagnetic field levels to be used for an operational ELF system. GRA

N76-17801# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
NITROGEN EXCHANGE ACROSS THE LUNGS IN RESTING MAN. FLYING PERSONNEL RESEARCH COMMITTEE
C. Davidson, P. A. Fennessy, and M. H. Harrison Feb. 1975 19 p refs
(AD-A015133; FPRC-1338) Avail: NTIS CSCL 06/16

The relationship between the partial pressure of N2 in the inspired air (PIN2), and the nitrogen transfer across the lungs (VN2), has been examined in eight resting subjects, and a study made of the effect of diet upon this relationship. Alterations in PIN2, over the range 60 mm Hg below to 20 mm Hg above ambient PIN2, caused changes in VN2 which could be described by a linear equation. These changes agreed both in magnitude and direction with those predicted by a four-compartment electrical analogue of the body N2 stores. They were not affected by the protein content of a meal taken three quarters hour before the start of measurements of VN2. The study has confirmed that N2 is metabolically inert, and indicates that the open circuit method of estimating oxygen consumption is accurate. GRA

N76-17802# Royal Air Force Inst. of Aviation Medicine, Farnborough (England). Flying Personnel Research Committee.
THE EFFECT OF EXERCISE AND THERMAL STRESS ON PLASMA VOLUME
M. H. Harrison, R. J. Edwards, and D. R. Leitch Feb. 1975 25 p refs
(AD-A015132; FPRC-1337) Avail: NTIS CSCL 06/19

Six male subjects exercised for 50 min at 25% and 55% of their estimated aerobic capacities in environments of 42C db, 35C wb, and 30C db, 24C wb respectively. Alterations in the haematocrit, haemoglobin and plasma protein concentrations, and in the activity of an injected aliquot of isotopically labelled albumin, were each used to calculate the percentage change in plasma volume occurring during exercise and recovery. It is concluded that exercise is associated with an increased translocation of protein, this leading to elevated plasma protein levels during recovery which favor the return of water to the intravascular space. Haemoglobin concentration is considered to be the most reliable measure of plasma volume change during exercise. GRA

N76-17803# Texas Univ., Austin. Bio-Medical Engineering Research Lab.
TEMPERATURE RISE IN FUNDUS EXPOSED TO LASER RADIATION Final Report, 1 May 1973 - 30 Apr. 1974
Ashley J. Welch, Clarence P. Cain, and Leslie A. Priebe Aug.

1975 79 p refs
(Contract F41609-73-C-0031; AF Proj. 6301)
(AD-A014819; SAM-TR-75-32) Avail: NTIS CSCL 06/18

Temperature measurements were made in the eyes of living rhesus monkeys with 20 micrometers copper-nickel thermocouples. The temperature rise at the center of 100 micrometers - 200 micrometers (half-power diameter) ophthalmoscopically visible lesions was used as a measurement of the threshold of damage to the eye. The appearance of a minimal visible lesion 5 minutes postexposure was the criterion for damage. Threshold temperature rise was measured for 0.1-sec, 1-sec, and 10-sec exposures to an argon (4880 A) laser. Thresholds were acquired for both macular and paramacular (temporal) exposure sites. The average macular threshold temperatures at 0.1 sec, 1 sec, and 10 sec were 29.8 C, 24.4 C, and 20.0 C respectively. For paramacular insertions the average temperature rise above ambient (37 C) was 39.0 C for a 0.1-sec exposure, 28.8 C for a 1-sec exposure, and 24.7 C for a 10-sec exposure. The temperature rise was predicted by a finite differences model solution to the heat conduction equation. The model was 10%-20% lower than the experimentally measured temperature for a 10-sec exposure and approximately 10% higher for a 0.1-sec exposure.
Author (GRA)

N76-17804# School of Aerospace Medicine, Brooks AFB, Tex.
EXAMINATION OF NORMAL AND PATHOLOGIC MIDDLE EARS BY ACOUSTIC TIME; DOMAIN REFLECTOMETRY Final Report, 1 Jan. - 31 Dec. 1973
Kent K. Gillingham Jun. 1975 39 p refs
(AD-A014818; SAM-TR-75-18; SAM-Review-2-75) Avail: NTIS CSCL 06/5

The technique of time-domain reflectometry (TDR), commonly used to locate and identify distant impedance mismatches on electrical transmission lines, was utilized in an attempt to accomplish the time-domain equivalent of acoustic impedance measurements on normal and a variety of pathologic middle ears. An acoustic transmission line and transceiver were used to deliver acoustic impulses to the middle ear through the external auditory canal and display the reflected acoustic signals on a CRO. No recognizable difference between the reflectograms of otosclerotic and normal ears was seen, and the reflections from ears with ossicular discontinuity were inconsistently different from those of normal ears. Perforated ears and ears containing fluid, however, did provide characteristic reflectograms. Several simple physical models of the external auditory canal and middle ear were tested with the acoustic reflectometer and found to provide responses similar to those from real ears. Transient responses of simple electrical analogs of normal and fluid-filled ears were generated on a computer, and waveforms similar to those seen in the corresponding acoustic reflectograms were obtained. Present short-comings and potential strengths of acoustic TDR are discussed, and several means of improving its precision are suggested.
Author (GRA)

N76-17805# Naval Submarine Medical Research Lab., Groton, Conn.
THE LONGITUDINAL HEALTH STUDY, VISUAL CHARACTERISTICS OF 750 SUBMARINERS Medical Research Progress Report No. 4
Jo Ann S. Kinney, Alma P. Ryan, S. M. Luria, Helen M. Paulson, and Christine L. McKay 19 Dec. 1974 19 p refs
(AD-A014856; NSMRL-800) Avail: NTIS CSCL 06/14

A number of tests of visual health and ability are included in the ongoing Longitudinal Health Study of submariners. This paper reports on the findings to date on these visual measures for 750 submariners. The results show that the visual and ocular health of the men is good; color vision, intraocular pressures, and artery to vein ratios in the fundus are all normal. On the other hand, the men evidence poorer acuity, more myopia, a tendency toward esophoria and less accommodative ability than is expected from population statistics.
GRA

N76-17806# Louisville Univ. Foundation, Inc., Ky.
HEARING CONSERVATION: INTENSE ACOUSTIC STIMULATION AND NOISE SUSCEPTIBILITY IN THE MILITARY ENVIRONMENT Final Report, 1 Oct. 1971 - 31 Mar. 1974
Michel Loeb, Bill R. Brown, Paul D. Cameron, and George A. Luz Nov. 1974 13 p refs
(Contract DADA17-72-C-2039)
(AD-A015023) Avail: NTIS CSCL 06/16

The technical objectives of this study were: (1) Assessment of current hazards to hearing and of current hearing conservation practices in the field; (2) Resolution of certain questions regarding past studies of temporary threshold shift; (3) Determination of the hearing capacities of those currently in the military or likely to be, comparison of those capacities with those of analogous groups in years past, and assessment of the practical significance of any changes observed; (4) Measurements of changes in auditory characteristics other than absolute intensive threshold, following noise exposure; and (5) Development of indices of susceptibility to permanent hearing loss.
GRA

N76-17807# Defence Research Establishment Ottawa (Ontario).
THE AMOUNTS OF MOISTURE EMITTED FROM THE EYES AND PERIORBITAL AREAS
Malcolm M. Dewar and Lloyd G. Wilson Mar. 1975 21 p refs
(AD-A014923; DREO-TN-75-8) Avail: NTIS CSCL 06/16

The report presents the results of experiments carried out to determine the amount of moisture emitted by the eyes and the periorbital areas under various conditions of temperature, humidity and activity. Under ambient laboratory conditions the rate of moisture emission from the eyes varied between 0.3 and 1.5 g/h.
GRA

N76-17808# Army Natick Development Center, Mass.
THE EFFECTS OF CALORIC DENSITY OF THE FOOD ON RUNNING ENDURANCE AND GENERAL CONDITION OF RATS AND HAMSTERS RESTRICTED IN FOOD INTAKE OR FED AD LIBITUM
D. Tollenaar Jun. 1975 48 p refs
(DA Proj. 1T1-61102-A-71C)
(AD-A014896; NDC-TR-75-112-FSL) Avail: NTIS CSCL 06/3

Young adult male rats and hamsters, after a treadmill training period, were divided into 6 groups, receiving 20, 40 or 70% dietary fat calories and fed ad libitum or 40% by weight of average ad libitum intake. All animals were run to exhaustion once a week. Increased dietary fat level was not correlated with superior running performance at either food intake level, although during restricted feeding the high fat groups received more calories. Increased running endurance and kgm performance were correlated with lower body weight at both food intake levels. The rate of performance increase with decreasing body weight during food restriction was significantly higher for the low than for the high fat rat group. Water consumption was considerably lower during restricted than during ad libitum feeding. Plasma glucose in the rats was lower for the 70% than for the other fat levels at both levels of food intake, lower from day 8 on during restricted than during ad libitum food intake, and lower on day 15 than on day 8 of the restricted intake. In the hamsters, average plasma triglyceride levels were 76% and plasma total cholesterol levels 22% (significant) higher in non-exercised than in regularly exercised animals right after running to exhaustion.
GRA

N76-17809# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
STANDARDIZING THE DYNAMICS OF MAN
H. E. VonGierke Jun. 1975 18 p refs Repr. from Shock and Vibration Bull., Bull-45, Pt. 2 Presented at the 45th Shock and Vibration Symp., Dayton, Ohio, 22-24 Oct. 1974
(AF Proj. 7231)
(AD-A014919; AMRL-TR-74-129) Avail: NTIS CSCL 06/19

A brief review of progress in biodynamics over the past two decades has illustrated the important advances made in defining and predicting man's response to shock and vibration environments. Recent developments of standards in this area are emphasized since they indicate the practical application of the generally agreed upon results. These standards should be of interest to the designers of all transportation vehicles - water,

land, air and space - and the designers of buildings as well as heavy machinery. GRA

N76-17810# State Univ. of New York, Buffalo. Dept. of Physiology.
MAN-WATER-PRESSURE. VOLUME 2: PUBLICATIONS IN UNDERWATER PHYSIOLOGY, 1967 - 1974
Edward H. Lanphier and Hermann Rahn Mar. 1975 228 p refs
(Contract N00014-71-C-0342)
(AD-A016593) Avail: NTIS CSCL 06/19

Contents: Chamber facilities; Human respiration; Submersion; Reflex responses; Cellular changes; Gas pockets; Oxygen toxicity; Exposures to pressures; Gaseous diffusion. GRA

N76-17811# Deutsche Gesellschaft fuer Luft- und Raumfahrt, Cologne (West Germany).
REALISTIC FLIGHT SIMULATION
1975 45 p refs In GERMAN; ENGLISH summary Proc. of the 16th Meeting of the DGLR Anthropotech. Comm., Frankfurt, 6 Nov. 1974
(DLR-Mitt-75-18) Avail: NTIS HC $4.00; DFVLR, Cologne DM 18.10

Technical and static and dynamic coupling problems of visibility simulation equipment for flight simulators are discussed. Flight simulator tests of sudden pilot incapacitation are evaluated with regard to flight safety improvement. An economic analysis of Boeing 707 simulators for crew training is presented.

N76-17812 Deutsche Lufthansa Aktiengesellschaft, Frankfurt am Main (West Germany).
SOME PROBLEMS IN THE COUPLING OF VISIBILITY SIMULATION EQUIPMENT TO FLIGHT SIMULATORS [EINIGE PROBLEME BEI DER AUFSCHALTUNG VON SICHTSIMULATIONSANLAGEN AUF FLUGSIMULATOREN]
M. Wekwerth *In* DGLR Realistic flight simulation 1975 p 7-17 In GERMAN

Technical and static and dynamic coupling problems of visibility simulation equipment for flight simulators are discussed. It is clear that all software changes for adapting a simulated aircraft and a visual aid to each other lead to repercussions in the aircraft mathematical model. Deviations of certain aircraft data therefore cannot be prevented. ESA

N76-17813 Deutsche Lufthansa Aktiengesellschaft, Frankfurt am Main (West Germany).
TRAINABLE CREW BEHAVIOR IN THE FLIGHT SIMULATOR FOR PILOT INCAPACITATION [IM FLUGSIMULATOR TRAINIERBARES CREW-VERHALTEN BEI PILOT INCAPACITATION]
H. H. Renemann *In* DGLR Realistic Flight Simulation 1975 p 19-30 refs In GERMAN

Flight simulator tests for sudden pilot incapacitation are evaluated with regard to flight safety, and measures for improving flight safety in these cases are discussed. ESA

N76-17814 Deutsche Lufthansa Aktiengesellschaft, Frankfurt am Main (West Germany).
THE ECONOMY OF FLIGHT SIMULATORS FOR CREW TRAINING EXEMPLIFIED FOR A BOEING 707 SIMULATOR [DIE WIRTSCHAFTLICHKEIT VON FLUGSIMULATOREN FUER DIE BESATZUNGSSCHULUNG AM BEISPIEL EINES BOEING-707-SIMULATORS]
W.-D. Hass *In* DGLR Realistic Flight Simulation 1975 p 31-39 In GERMAN

An economic analysis of flight simulators for crew training is presented. Two Boeing 707 training programs are compared from the point of view of training times and costs. It is shown that a new type (of flight simulator (Redifon) is cost effective, since an accepted higher degree of reality is obtained using this simulator. ESA

N76-17815# URS/Matrix Co., Falls Church, Va.
FULLY PROCEDURALIZED JOB PERFORMANCE AIDS: GUIDANCE FOR PERFORMING BEHAVIORAL ANALYSES OF TASKS Final Report, 1 May 1971 - 3 Feb. 1975
Edgar L. Shriver Brooks AFB, Tex. AFHRL Jun. 1975 47 p refs
(Contract F33615-71-C-1638; AF Proj. 1127; AF Proj. 1710)
(AD-A015059; AFHRL-TR-75-38) Avail: NTIS CSCL 05/9

The initial tryout of the subject job aids (FPJPA), for the UH-1H helicopter, indicated that although they met all the format requirements they did not produce the expected level of task performance when used by novice and apprentice Air Force maintenance personnel. The author hypothesized that the FPJPA did not contain all the cues and directions necessary for the novice or apprentice. This report describes a method for identifying such cues and responses during a hands on tryout of the initially produced task steps, called behavioral analyses of tasks (BAT). The application of this BAT to many tasks produced an unfolding effect from pictorial to pictorial. It also identified many important but unplanned cues in the troubleshooting routines. Its application to the eleven UH-1H tasks used for the evaluation raised the performance level of both novice and apprentice personnel. GRA

N76-17816# Applied Science Associates, Inc., Reston, Va.
GUIDEBOOK FOR DEVELOPING CRITERION-REFERENCED TESTS
Robert W. Swezey and Richard B. Pearlstein Aug. 1975 187 p refs
(Contract DAHC19-74-C-0018; DA Proj. 2Q1-64715-A-757)
(AD-A014987; Rept-287-AR18(2)-1R-0974) Avail: NTIS CSCL 05/10

This manual outlines the rationale for using the CRT approach and suggests specific guidelines for test developers to use in constructing test items. Methods for assessing the adequacy of a CRT are also provided. Author (GRA)

N76-17817# Air Force Human Resources Lab., Brooks AFB, Tex.
IMPACT OF COMPUTER BASED INSTRUCTION ON ATTITUDES OF STUDENTS AND INSTRUCTORS: A REVIEW Final Report
Anne Truscott King May 1975 21 p refs
(AF Proj. 1121)
(AD-A014797; AFHRL-TR-75-4) Avail: NTIS CSCL 05/10

The review examines the evidence which bears on the issue of whether contact with computer-based instruction leads to feelings of depersonalization or dehumanization. The approach is to document investigations which employ the larger construct of attitudes toward various modes of computer-based instruction which are found to be held by students and instructors before, during, or after exposure to computer-based instruction. Evaluation of pertinent factors which influence attitudes was made through an assessment of relevant literature and personal communication with experts associated with several CAI and CMI projects in the United States. GRA

N76-17818# General Electric Co., Daytona Beach, Fla.
AIRBORNE ELECTRO-OPTICAL SENSOR SIMULATION Final Report, May 1974 - Feb. 1975
M. Bunker and R. Heeschen Jul. 1975 108 p refs
(Contract F33615-74-C-5161)
(AD-A016725; AFHRL-TR-75-35) Avail: NTIS CSCL 05/9

Cost effective training of personnel in operation of infrared (IR) and low light level television (LLLTV) systems requires the development of real-time ground based equipment for simulating the performance characteristics of such systems. Such hardware must be carefully specified to provide the essential degree of validity in simulation of performances and detail of visual cues. The major effort covered in this report has been the development of an extremely versatile and unconstrained software simulation model. In such a system, increasing the complexity of scenes and of modeling computation incur no increase in cost, but are accommodated by allowing increased processing time. With essentially unconstrained scene detail capability, transfer function definition, tonal assignment capability, noise simulation characteristics, and atmospheric effects simulation, the model can readily

be adjusted to simulate the characteristics of actual systems, present or future. It can further be set up to show the precise effect of simulation hardware specifications differing from actual equipment, to meet the goal of precise hardware specification.
GRA

N76-17819# School of Aerospace Medicine, Brooks AFB, Tex.
NEPTUNE: MODIFICATIONS AND CURRENT APPLICATIONS Final Report, Jun. 1973 - Dec. 1974
Russell A. Benel and William F. Storm Aug. 1975 41 p refs
(AD-A016722; SAM-TR-75-20) Avail: NTIS CSCL 05/10

Recent modifications of the Neptune psychomotor test apparatus and a brief description of individual tasks are presented. Currently available system workload program listings and typical learning data under these workloads are discussed. Standardized instructions for the Neptune operator console are provided. Previous Neptune use is documented in an annotated bibliography.
GRA

N76-17820# Army Aeromedical Research Lab., Fort Rucker, Ala.
OBJECT VISIBILITY PATTERNS IN LOW LEVEL FLIGHT Final Report
Robert H. Wright and J. Nicholas DeBonis Sep. 1975 38 p refs
(DA Proj. 3A7-62758-A-819)
(AD-A016886; USAARL-76-5) Avail: NTIS CSCL 06/16

Line of sight viewing angle, range and time distributions are given for a 70 kilometer sample of tree-top level annular (fisheye) imagery, and comparison made between these data and theoretical random single tree line of sight distributions. The effects of location over open and tree covered terrain are assessed, and limited data on the effect of altitude presented. Relative azimuth, elevation and range of objects when they first emerged into view were recorded by type of object. Relative angle of crossing linear features was determined, along with the duration that information of navigational value could be determined. When over trees the actual masking function was grossly different from the theoretical curves, while over open terrain actual masking approximated the five percent cover theoretical curve at close range and the one percent curve at 1000 meters. Over trees, masking for tank-size vehicles ranged from 83 to 93 percent, and over open terrain from 10 to 77 percent masking. Only 12.5 percent of linear features were found to be oriented within plus or minus 30 degrees of the nose at crossing, while 58.3 percent were within plus or minus 30 degrees of perpendicular to the nose. This finding implies that viewing to the sides as an aircraft crosses features is necessary in order to see the feature details that will provide positive geographic orientation. The detailed viewing along linear features required for positive geographic orientation was available for an average of 24 meters, or one second at 50 knots. Limited data are presented on the effect of altitude on duration of line of sight to objects that provide information of value in geographic orientation.
Author (GRA)

N76-17821# Teledyne Brown Engineering, Huntsville, Ala.
EVALUATION OF GLARE REDUCTION TECHNIQUES Final Report, 14 Jun. 1974 - 20 Jun. 1975
W. L. Raine, N. E. Chatterton, and A. R. Dunn Sep. 1975 120 p refs
(Contract DOT-HS-801-718)
(PB-245624/2; DOT-HS-801-718) Avail: NTIS HC $5.50 CSCL 13F

Degradation of the visual capacity of a motor vehicle driver caused by luminous sources on the driver's own vehicle during daylight is quantified according to luminance glare theory. Effects of driver's age and daylight conditions are considered, and a means for laboratory measurement of vehicle glare production characteristics is developed. Based upon a probabalistic model of target detection, allowable glare in the field of view is determined. It is found that spot glare sources do not materially contribute to degradation of visual capacity (with the model), and that the dash of the motor vehicle is generally the largest contributor to glare.
GRA

N76-17822 Kansas State Univ., Manhattan.
DESIGN OF A PERSONAL DRY-ICE COOLING GARMENT: ITS PHYSIOLOGICAL AND HEAT TRANSFER ASPECTS Ph.D. Thesis
Jerry Richard Duncan 1975 239 p
Avail: Univ. Microfilms Order No. 76-2927

A personal dry ice cooling jacket for workers in industrial heat stress environments was developed following three stages of prototype design and evaluation. The Model-B1 cooling jacket was evaluated in two industrial environments (a tire manufacturing plant and a chemical manufacturing plant) on six workers. Modifications suggested by the industrial workers, laboratory subjects, and physiological data were incorporated into the design of Model-C.
Dissert. Abstr.

N76-17823*# Pillsbury Mills, Inc., Minneapolis, Minn.
SPACE SHUTTLE FOOD SYSTEM STUDY: FOOD AND BEVERAGE PACKAGE DEVELOPMENT, MODIFICATION 8S Final Report
Jan. 1976 117 p
(Contract NAS9-13138)
(NASA-CR-147431) Avail: NTIS HC $5.50 CSCL 06K

A new, highly utile rehydration package was developed for foods in zero gravity. Rehydratable foods will become more acceptable as a result of their overall rehydration capability and improved palatability. This new package design is greatly enhanced by the specified spacecraft condition of atmospheric pressure; the pressure differential between the atmosphere and the package carries the functional responsibility for rapid food rehydration without excess package manipulation by the consumer. Crew acceptance will further be enhanced by less manipulation, hotter rehydration water temperatures and the ability to hold the foods at preparation temperatures until they are consumed.
Author

N76-17824*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
TRADE STUDY FOR WATER AND WASTE MANAGEMENT CONCEPTS. TASK 7: SUPPORT SPECIAL ANALYSIS Final Report
Nov. 1975 113 p refs
(Contract NAS9-13404)
(NASA-CR-147432; MDC-G5853) Avail: NTIS HC $5.50 CSCL 06K

Cost analyses and tradeoff studies are given for waste management in the Space Station, Lunar Surface Bases, and interplanetary space missions. Crew drinking water requirements are discussed and various systems to recycle water are examined. The systems were evaluated for efficiency and weight savings. The systems considered effective for urine water recovery were vapor compression, flash evaporation, and air evaporation with electrolytic pretreatment. For wash water recovery, the system of multifiltration was selected. A wet oxidation system, which can process many kinds of wastes, is also considered.
J.R.T.

N76-17825*# Martin Marietta Corp., Denver, Colo.
SPACECRAFT UTENSIL/HAND CLEANSING FIXTURE Final Report
Arthur A. Rosener, Thomas G. Jonkoniec, Debra A. Wilson, and Jon R. Schulz Dec. 1975 145 p
(Contract NAS9-14671)
(NASA-CR-147425; MCR-75-486) Avail: NTIS HC $6.00 CSCL 06K

A system concept for an inflight utensil/hand cleansing fixture is described which includes the following features: (1) capability for efficient cleansing and rinsing of utensils or hands, and (2) provision for general waste fluid disposal. The design concept provides for the capability of functioning for a 30 day shuttle mission containing seven occupants/users. The long range goal is to provide a functioning system capable of operating for missions of at least 120 days. The fixture is a self-contained unit that can be installed in the standard water interface requirements. Service to the unit is a single source of unheated potable water and water is discharged from the unit into a single return waste connection. In addition, the design includes provisions for the intake and discharge of purge air and the discharge of evolved

gases. Both the air and the gases are filtered or processed in the assembly before releasing them into the habitability area.
Author

N76-17826*# Hamilton Standard, Windsor Locks, Conn.
FUSIBLE HEAT SINK FOR EVA THERMAL CONTROL Final Report
George J. Roebelen, Jr. Dec. 1975 112 p
(Contract NAS2-8912)
(NASA-CR-137769; SVHSER-6821) Avail: NTIS HC $5.50 CSCL 06K

The preliminary design and analysis of a heat sink system utilizing a phase change slurry material to be used eventually for astronaut cooling during manned space missions is described. During normal use, excess heat in the liquid cooling garment coolant is transferred to a reusable/regenerable fusible heat sink. Recharge is accomplished by disconnecting the heat sink from the liquid cooling garment and placing it in an on board freezer for simultaneous slurry refreeze and power supply electrical rechange.
Author

N76-17827*# Ionics, Inc., Watertown, Mass.
WATER VAPOR DIFFUSION MEMBRANE DEVELOPMENT Final Report, Feb. 1975 - Jan. 1976
Michael K. Tan Jan. 1976 71 p
(Contract NAS2-7651)
(NASA-CR-137804) Avail: NTIS HC $4.50 CSCL 06K

A total of 18 different membranes were procured, characterized, and tested in a modified bench-scale vapor diffusion water reclamation unit. Four membranes were selected for further studies involving membrane fouling. Emphasis was placed on the problem of flux decline due to membrane fouling. This is discussed in greater details under 'Summary and Discussion on Membrane Fouling Studies' presented in pages 47-51. The system was also investigated for low temperature application on wash-water where the permeated water is not recovered but vented into space vacuum.
Author

N76-17828*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
COMBINATION OF AN ELECTROLYTIC PRETREATMENT UNIT WITH SECONDARY WATER RECLAMATION PROCESSES Final Report
G. W. Wells and M. S. Bonura Sep. 1973 205 p refs
(Contract NAS1-11781)
(NASA-CR-147448; MDC-G4787) Avail: NTIS HC $7.75 CSCL 06K

The design and fabrication of a flight concept prototype electrolytic pretreatment unit (EPU) and of a contractor-furnished air evaporation unit (AEU) are described. The integrated EPU and AEU potable water recovery system is referred to as the Electrovap and is capable of processing the urine and flush water of a six-man crew. Results of a five-day performance verification test of the Electrovap system are presented and plans are included for the extended testing of the Electrovap to produce data applicable to the combination of electrolytic pretreatment with most final potable water recovery systems. Plans are also presented for a program to define the design requirements for combining the electrolytic pretreatment unit with a reverse osmosis final processing unit.
Author

N76-17829# Navy Clothing and Textile Research Unit, Natick, Mass.
VISOR SYSTEM MATERIALS FOR ALUMINIZED FIREMEN'S HOODS. REPORT 2: EVALUATION OF GOLD COATED PLASTIC SUBSTRATES
Norman F. Audet Jun. 1975 54 p refs
(AD-A015310; TR-113-Rept-2; Rept-1-75) Avail: NTIS CSCL 06/17

The Navy Clothing and Textile Research Unit became concerned with the poor durability characteristics of the gold-coated facepiece component of the crash-crew firefighter's visor system and established a program to identify the problems associated with the facepiece. Several experimental transparent plastic sample materials were obtained uncoated, gold coated, and gold coated and overcoated with different types of protective overcoatings and evaluated to determine the following: Heat transmission characteristics of the uncoated transparent plastic substrates; heat transmission characteristics of the gold coatings with and without the different types of overcoatings on the transparent plastic substrates; durability characteristics of the coated materials.
GRA

N76-17830# Systems Research Labs., Inc., Dayton, Ohio.
EVALUATION OF PHYSIOLOGICAL INPUTS TO HIGH G PERFORMANCE MODELS Final Technical Report, 15 Mar. - 30 Jun. 1974
Franklin P. Witte, Anil V. Phatak, and Jerry F. Green Wright-Patterson AFB, Ohio AMRL Jul. 1975 82 p refs
(Contract F33615-74-C-4062)
(AD-A014813; AMRL-TR-74-103) Avail: NTIS CSCL 06/19

This report presents a review of physiological model structures and recent acceleration studies that are applicable to the problem of modeling the response of the human cardiovascular system to -Gz acceleration. A recently published model of cardiovascular response is analyzed as a closed loop control system. Certain problems associated with the direct simulation of such models are identified, and methods of removing these difficulties are considered. A revised model is derived, and the results of preliminary analysis and simulation of this model are presented. A discussion of the physiological aspects of developing an improved model is included, and the next steps toward implementing this model are outlined. A brief synopsis of several recent relevant acceleration studies concludes the report.
Author (GRA)

N76-17831# Naval Submarine Medical Research Lab., Groton, Conn.
PROCEEDING OF THE INTERNATIONAL WORKSHOP ON ESCAPE AND SURVIVAL FROM SUBMERSIBLES Final Report
Charles F. Gell and James W. Parker 15 Oct. 1974 167 p Proc. held at Groton, Conn., 20-22 Jun. 1972
(AD-A014871; NSMRL-794) Avail: NTIS CSCL 06/7

The report presents the proceedings of the International Workshop on Escape and Survival from Submersibles held at the Naval Submarine Medical Research Laboratory at the Naval Submarine Base in Groton, Connecticut USA, 20-22 June 1972. This Workshop was jointly sponsored by the U.S. Navy's Bureau of Medicine and Surgery and the Office of Naval Research. Twenty-one papers were presented, including an historical overview, a presentation of the procedures for training in the Royal Navy and the U.S. Navy, problems of prediction and treatment of decompression sickness, and outlines of escape procedures in both Navies; free-ascent techniques, and escape under saturated conditions; individual escape techniques, McCann Bell procedures and rescue via deep submergence vehicles. GRA

N76-17832# Calspan Corp., Buffalo, N.Y.
DEVELOPMENT OF AN IMPROVED COMPUTER MODEL OF THE HUMAN BODY AND EXTREMITY DYNAMICS
J. T. Fleck and F. E. Butler Jul. 1975 163 p refs
(Contract F33615-75-C-5002; AF Proj. 7231)
(AD-A014816; AMRL-TR-75-14) Avail: NTIS CSCL 06/5

Three principal modifications; namely, an improved joint formulation, an improved belt restraint formulation and inclusion of aerodynamic forces, were incorporated into the Phase III Calspan Three-Dimensional Crash Victim Model Simulation. GRA

N76-17833# Army Natick Development Center, Mass. Food Engineering Lab.
STORAGE STUDY OF INDIVIDUAL SERVINGS OF SUBSISTENCE AT VARIOUS TEMPERATURES Final Report
Marilee D. Witt and Stanley G. Wisniewski Aug. 1975 29 p refs
(AD-A014939; FEL-15; NDC-TR-75-85-FEL) Avail: NTIS CSCL 06/8

While some packaging materials appear to offer more protection to individual servings of subsistence, the results of this study indicate that the dominant factor in long-term acceptance of any product is a low storage temperature. Irrespective of the product and the method of packaging, product

stored at 4.4 C (40 F) is superior to product stored at 21.1 C (70F) which, in turn, is superior to product stored at 32.2 C (90F). Author (GRA)

N76-17834# Alliance for Engineering in Medicine and Biology, Chevy Chase, Md.

A 5-YEAR RESEARCH AND DEVELOPMENT AGENDUM FOR ULTRASONIC IMAGING DIAGNOSTIC INSTRUMENTATION. AN ASSESSMENT OF SELECTED MEDICAL INSTRUMENTATION Final Report

J. H. Busser Apr. 1975 127 p refs

(Grant NSF ATA-73-03255-A03)

(PB-245680/4; Pub-N-1975-1; NSF/RA/T-75/023) Avail: NTIS HC $6.00 CSCL 06L

A priority list of research and development objectives in medical ultrasound was assembled to indicate needed development of new capabilities in diagnosis over the next five years. Detailed rationale and the complex relationships between issues are given. The four previously published, discipline-oriented reports, from which the list was developed, are included in full as appendices. Thus, a complete background of information is provided for decision making in this field. The useful life of the report is expected to extend over a 3-5 year period. GRA

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